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GUY'S HOSPITAL REPORTS.

EDITED BY
H. G. HOWSE, M.S.,
AND
FREDERICK TAYLOR, M.D.

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CONTENTS.

	PAGE
I. Cases illustrating the Diuretic Action of the Resin of Copaiba. By FREDERICK TAYLOR, M.D.	1
II. Considerations on the Cures in Insanity. By G. H. SAVAGE, M.D.	57
III. On Fractures of the Thigh. By J. COOPER FORSTER .	117
IV. On Meningeal Hæmorrhage. By JAMES F. GOODHART, M.D.	181
V. On the Causes of Preventable Blindness. By C. HIGGINS	179
VI. Contributions to Dental Pathology. By S. J. A. SALTER, M.B., F.R.S.	213
VII. A Description of the Appearances of the Human Eye in Health and Disease, as seen by the Ophthalmos- cope. Ninth Series—Retinitis Pigmentosa. By C. BADER	229
VIII. On the Use and Administration of Sedatives. By P. H. STOKOE, B.A., M.D.	233
IX. Statistics of Amputations. By C. H. GOLDING-BIRD, B.A., M.B.	253
X. Fifth Report of the Guy's Hospital Lying-in Charity, from October 1, 1863, to September 30, 1875. By A. L. GALABIN, M.D.	265
XI. On the Treatment of Ulcers by the Local Application of a Weak Continuous Electric Current. By C. H. GOLDING-BIRD, B.A., M.B.	341

	PAGE
XII. A Case of Fracture of the Skull, followed by a Collection of Cerebro-spinal Fluid beneath the Scalp. By R. CLEMENT LUCAS, B.S.	363
XIII. Nitro-benzol Poisoning. By T. STEVENSON, M.D.	371
XIV. Remarks on some of the Paroxysmal Neuroses. By C. HILTON FAGGE, M.D.	375
XV. On the Recognition of Sugar in Healthy Urine. By F. W. PAVY, M.D., F.R.S.	413
XVI. Note on the Use of Chloral for the Preservation of Subjects and Anatomical Preparations. By H. G. HOWSE, M.S.	429
XVII. Statistical Analysis of the Patients treated in Guy's Hospital during the year 1875. By J. C. STEELE, M.D.	433
List of Pupils who have passed the several Medical Examining Boards	453
List of Prizemen and Medallists	459
List of Pupils who have received Appointments at Guy's Hospital	460

LIST OF PLATES.

	TO FACE PAGE
Mr. BADER.	
Chromo-lithograph, illustrating the Ophthalmoscopic Appearances of Retinitis Pigmentosa	232
Mr. CLEMENT LUCAS.	
Plate, illustrating a Fracture of the Skull, with Collections of Cerebro-spinal Fluid beneath the Scalp	363
Dr. STEVENSON.	
Plate, showing a Fac-simile of Prescriptions in a Case of Nitro-benzol Poisoning	374

LIST OF WOODCUTS.

	PAGES
Mr. FORSTER.	
Figure, illustrating the Arrangement of the Limb in Hodgen's Splint	122
Mr. SALTER.	
Five figures, illustrating Odontomes	215—222
Dr. PAVY.	
Figure, illustrating Apparatus used in the Fermentation Test for Sugar in the Urine	422

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CASES
ILLUSTRATING THE
DIURETIC ACTION OF THE RESIN OF
COPAIBA.

BY FREDERICK TAYLOR, M.D.

SINCE Dr. Wilks drew attention in 1873,¹ not so much to the diuretic properties of copaiba as to the possibility of prescribing it in a comparatively agreeable form, the resin of copaiba has been given at Guy's Hospital in numerous cases, which are of sufficient interest in relation to the effects of this drug to deserve a place in our reports. For though the diuretic properties of copaiba are acknowledged, they receive but scant notice in our text-books, which confine their remarks on the balsam to its application in gonorrhœa, leucorrhœa, vesical catarrh, and chronic bronchitis. No mention is made of either balsam or oil being employed as a diuretic; while the resin is scarcely credited with any therapeutical action whatever. Pereira² says,—probably, however, with reference to its action in gonorrhœa,—“the resin of copaiba, which was much extolled a few years since, is the least active part of the balsam.” And the same expression is repeated in the abridgment of Pereira's work, published more recently.³

Garrod⁴ treats the matter similarly, and Neligan⁵ merely

¹ ‘The Lancet,’ 1873, vol. i, pp. 410 and 893.

² ‘The Elements of Materia Medica,’ 1857, vol. ii, pt. ii, p. 373.

³ ‘Manual of Materia Medica and Therapeutics,’ edited by Dr. F. J. Farre, 1865.

⁴ ‘The Essentials of Materia Medica and Therapeutics,’ 1869.

⁵ ‘Medicines, their Uses and Modes of Administration,’ 1858, p. 430.

remarks of the resin, that "this preparation is very properly discarded from practice." On the other hand, the oil is an officinal preparation, and is preferred by many as equal to the balsam in therapeutical effect and more convenient in administration.

This view of the relative value of the two constituents has not been universally adopted. In 1860 Weikart,¹ arguing that copaiba when given for the cure of gonorrhœa must act locally upon the urethral mucous membrane through the medium of the urine, set himself to discover which of its constituents, the oil or the resin, was secreted with this fluid by the kidneys. After ingestion of the oil, the urine showed no evidence of its presence; indeed, it was found experimentally to be only soluble in urine to the extent of 1 part in 1000, and no precipitate of oil droplets could be obtained by the addition of nitric acid to urine previously shaken with it. On the other hand, Weikart pointed to the fact that the precipitate which Dr. Owen Rees had many years previously recognised as a possible source of error in testing for albumen with nitric acid was really the resinous substance known by the name of copaivic acid.² From these facts he reasoned that the resin was the active constituent, and he explains the beneficial action of copaiba in gonorrhœa by supposing that the potash and soda salts of copaivic acid withdraw by exosmosis the neutral and acid fats from the pus-cells, which thus become shrivelled up,

¹ 'Archiv der Heilkunde,' vol. i, 1860, p. 176. Parkes, 'The Composition of the Urine,' 1860, p. 175.

² As will be seen by a reference to his paper in the 'London Medical Gazette' for December 11th, 1840, Dr. Rees distinctly recognised the resinous nature of the substance passed in the urine, and commenced some observations on the behaviour of other resins by testing the urine of patients who had been taking guaiacum. Weikart appears not to have known this, as he had been unable to meet with the original article; and the remarks on the subject, which he extracts from F. Simon, refer only to a later paper by Rees in the 'Guy's Hospital Reports' of April, 1841: this describes the method of distinguishing from albumen the precipitate under consideration, but contains no allusion whatever to its chemical composition and relations. Parkes ('The Composition of the Urine,' 1860, p. 175) quotes from Weikart, and also seems not to appreciate the full extent of Dr. Rees' observations. He says, "When nitric acid is added to the urine containing this acid (copaivic), a copious precipitate falls, which has been noticed by Simon and Rees, and considered to be of oily or gelatinous nature."

and are checked in their further production. Whether the resin is really the active part of the balsam when used for gonorrhœa, and whether, if given alone, it is of any value in this affection, it is not the purpose of the present paper to inquire; though I may observe that Mr. Howse, who has given it at my suggestion in gonorrhœa, tells me he has obtained decidedly good results from it. Evidence of older date to which, no doubt, Pereira alludes may be found in a small treatise by James Thorn.¹

I need make but a passing reference to the action of the balsam itself as a diuretic. The notices which have already appeared from time to time on the use of the resin called forth a short paper on the subject by Mr. E. L. Dixon.² He records three cases in which Durant's capsules of copaiba were exhibited with marked effect. In the first case, one of hepatic ascites, three capsules containing from five to ten minims each were given night and morning, and the daily excretion of urine rose quickly from 14 ounces to 60, 70, and 80 ounces. In a case of heart disease, with anasarca, the same dose increased the urine to 100 ounces, after the entire failure of digitalis, squills, spirits of nitre, and other diuretics; while in the third case, also one of mitral disease, with albuminuria and dropsy, the urine was at once increased in amount upon the administration of two capsules at night. The quantity reached 70, 80, and 90 ounces daily, while the albuminuria diminished and the ascites disappeared.

At the hospital the resin of copaiba has been administered in more than sixty cases. The present communication contains forty cases, some of which occurred under my own care, but the greater number under the care of my colleagues, to whom I am indebted for permission to publish the notes. In nearly all the cases dropsy was a prominent symptom; and this is what might be expected, when it is remembered that it is the condition in which the urine is most often scanty, and in which diuretics are most frequently indicated. All the important varieties of dropsy are represented, and the cases are classified according to the organ diseased; though in some the dropsy may have

¹ 'Observations on the Treatment of Gonorrhœa by a New Preparation from the Balsam of Copaiba,' 1827.

² 'The Practitioner,' vol. xiii, February, 1875, p. 81.

been the joint result of the morbid condition of two viscera. Thus, in one, dilatation of the heart was present with contracted liver; in others, advanced degeneration of the kidneys accompanied cardiac valvular disease. Such cases have been arranged according to the organ presumed to be primarily affected, or to be contributing mainly to the result.

The divisions are as follows :

1. Hepatic ascites.
2. Simple peritoneal effusion.
3. Cardiac dropsy.
4. Anasarca and ascites secondary to emphysema and bronchitis.
5. Pleuritic effusion.
6. Renal dropsy.

Limits of space and time compel me to omit the consideration of many points of great interest in connection with the mode of action of the drug, its passage into the urine, and the resemblance it bears to albumen when precipitated from the urine by nitric acid. For the same reasons the copious notes of the cases taken by the clinical assistants and clinical clerks have been reduced to a small bulk, scarcely more being retained than what has a direct and immediate bearing upon the fact of diuresis. But in any case it will be necessary to give some description of the physical properties of the resin, of the manner in which it is administered, and of the effects which generally result from its use.

The balsam of copaiba, as is well known, contains three chief substances—firstly, a volatile oil, the *Oleum Copaibæ* of the British Pharmacopœia; secondly, a small quantity of a brown, soft, or viscid resin; and thirdly, the substance in question, a hard resin, which has acid properties, and constitutes more than 50 per cent. of the oleo-resin. This acid, copaivic acid, is described by Pereira as amber-coloured, brittle, and crystallizable. Weikart states that the chemically pure copaivic acid is a chalk-white powder, scarcely soluble in water, with a bitter and acrid taste, though not so nauseous as the balsam or the oil. The substance supplied to Guy's Hospital¹ is of a dark green colour, transparent in thin layers, brittle and resinous in consistence, almost taste-

¹ By Messrs. Barron, Squire & Co. .

less, and with a faint odour resembling that of ordinary resin. It is soluble in alcohol, ether, and chloroform, from which it is thrown down on the addition of water; it dissolves in alkalies, and is separable from them again by acids. So far as this preparation is concerned, its difference from the acid as described by Pereira or Weikart is easily explained; it is the residue of the distillation of the *Oleum Copaibæ*, and therefore, though consisting almost entirely of the hard resin, must still contain the other non-volatile constituents, such as the viscid resin, colouring matter, &c.

In our hospital dispensary the resin is softened with about one fourth of its bulk of rectified spirit, and thus converted into a viscid mass. Three ounces of this are rubbed down with four ounces of compound tragacanth powder, and mixed with four pints of water; one ounce of this mixture contains twelve or thirteen grains of the resin, and is given three times daily. The mixture forms a thick, whitish-green, opaque fluid, which deposits very slowly; being almost tasteless it is only unpleasant from the viscosity of the mucilage, and it is probably to this that the nausea, which not a few patients experience, especially after prolonged use of the medicine, must be ascribed.¹

It will not be necessary in this place to say more than a few words on the general effects of copaiba, as they will be discussed more in detail in connection with each class of cases. As a result of its administration in favorable cases the quantity of urine is quickly increased at the same time that its specific gravity is much lowered. In illustration of the first statement reference may be made to Case 2, in which the quantity rose from 20 ounces on the day of administration to 40 ounces on the second day after, and 56, 60, 74, and 96 on

¹ In the 'Pharmaceutical Journal' for July 26th, 1873, p. 63, Mr. A. W. Gerrard proposes the following:

"Take of Resin of Copaiba	15 grains.
Compound Powder of Almonds	30 "
Water to	1 ounce.

"Rub the resin with the powder until well incorporated, then add the water after the manner of forming an emulsion."

He recommends this in preference to his first formula, which was mentioned by Dr. Wilks in his second communication to the 'Lancet,' and is similar to that now used in Guy's Hospital.

succeeding days; to Case 3, in which it rose from 21 ounces to 68 on the following day, and after this to 68, 80, and 90; and to Case 6, in which it rose from 60 ounces to 122 on the following day, and 116, 126, 148, and 140 on succeeding days. One of the most striking instances is Case 5, in which the urine measured 18 ounces on the day the drug was first ordered, and 76 ounces on the following day.

The condition of the specific gravity has not been recorded in all the cases, but in many in which it has been taken it will be seen that a diminution occurred as a consequence of the employment of the medicine under discussion. Thus, in Case 1 the density fell from 1010 to 1004; in Case 2 from 1030 to 1016 on the second day, and to 1010 on the third; in Case 4 from 1018 and 1022 to 1012 and 1010; in Case 21 from 1017 to 1010; and in Case 31 from 1026 to 1011. It is to be observed also that the action of the drug in both these respects is very rapid, and that one or two doses suffice to produce a considerable effect. The urine has been generally saved from 10 a.m. on one day to 10 a.m. on the following, so that the number against any date represents the quantity passed in the twenty-four hours ending at 10 a.m. of that date; if, then, the medicine is ordered as usual at the visit of the physician in the early afternoon, certainly not more than two doses will have been taken by the next time of collecting the urine. A few experiments made on the healthy individual exemplify this as well as the fall in the specific gravity, though they are scarcely complete enough to be conclusive. In one the specific gravity fell to 1010 two hours after taking the drug; and in another it stood at 1008 two hours and a quarter after a full dose, namely, three ounces of the hospital mixture.

The diuresis so rapidly produced may as quickly subside when the drug is withdrawn; illustrations of this are not numerous in the cases reported, but may be seen in Nos. 15, 16, 18, and 29. In Case 16 there was a rapid fall from 80 ounces to 44 ounces; in Case 18 from 110 ounces to 64; and in Case 29, when, on the urine reaching 278 ounces, the medicine was omitted, only 74 ounces were passed on the following day.

One other fact in connection with the employment of copaiba, to which allusion has already been made, deserves some further

notice. The urine of persons taking this drug yields a turbidity and precipitate on the addition of nitric acid, and Dr. Rees and others have pointed out the means by which this can be distinguished from the precipitate which the same acid produces in albuminous urine. The precipitate of copaivic acid is not in general difficult to recognise, but it will often occur that the patient to whom it is desired to give the resin of copaiba has already albuminous urine, and in such cases I have sometimes been uncertain of the presence of the copaiba, and certainly in one case failed altogether to find it. What practical bearing or diagnostic value such observations may have I am at present unable to say, and must leave for future inquiry to determine, but it appears at least possible that the passage of copaiba with the urine in one case, and its absence from the secretion in another, may indicate differences in the structural condition of the kidney. The amount of the resin which comes through in the urine was remarked by Weikart¹ to bear a very small proportion to the quantity taken into the stomach; and the two experiments I have already mentioned pointed to the same conclusion, though undertaken for another purpose. This was to ascertain what time was required for the passage of the copaivic acid into the urine; and the experiments were made with the *Mistura Copaibæ Resinæ* on the healthy individual. In the first an ounce and a half, containing about 20 grains, were taken three hours after a full meal; the urine passed after forty-five minutes gave no precipitate nor turbidity with nitric acid, but some passed after one hour and twenty minutes became opalescent on the addition of either acetic or nitric acid. The same reaction occurred with that passed two hours after, but not with the next instalment passed nine hours after taking the drug.

In the second experiment three ounces of the mixture were taken two hours after a full meal. The urine passed after twenty minutes, forty minutes, and sixty minutes, gave no reaction, but a turbidity was produced in that passed one hour and twenty-five minutes after the dose, and the precipitate was abundant in that discharged fifty minutes later. Twelve hours after taking the medicine the urine became only faintly opalescent on the addition of nitric acid, and it was not further tested.

¹ Loc. cit.

ASCITES FROM DISEASE OF THE LIVER.

I have notes of 13 cases which fall under this heading. In one case (No. 9), that of a child, aged 6½ years, there was ascites with hepatic enlargement of uncertain nature; in another (No. 4) the liver was altered in shape by a thickened and contracted capsule, and the heart was enormously dilated; in the remaining eleven the disease was ordinary cirrhosis of the liver. The influence of the resin on the child was not very marked; the urine was moderately increased in quantity, and the ascites gradually diminished. But in the case of capsulitis, and all the cases of cirrhosis but three (Nos. 11, 12, 13), the diuresis produced was very decided. The urine reached in different instances 80, 90, and 100 ounces, while its specific gravity was reduced to 1010, 1008, and even 1004. In these cases also the beneficial influence upon the ascites was also quickly observed, the abdomen soon becoming less tense, and then diminishing in size at the rate, in one case (No. 1), of seven inches of circumference in eleven days, and in another (No. 5) of eight inches in eighteen days.

Of the three cases in which the resin failed to produce any effect one was already improving when it was administered (No. 12); paracentesis had been performed, and moderate diuresis kept up by digitalis, squill, and nitrous ether; no increase of urine was obtained from the resin, but the abdomen continued to diminish in size. In another case (No. 11) paracentesis was performed after a seven days' trial of the copaiba, but death followed in four days; while in the third case (No. 13) a slightly increased flow was the first result, but the great distension necessitated tapping, and the resin failed to act after this.

The results of the first ten cases appear to contradict very decidedly the assertion of Niemeyer,¹ that diuretics are as useless as they are irrational in the treatment of ascites, especially in the form of ascites under consideration. "If the ascites," he says, "is the result of portal obstruction, they do no more good than they would in œdema of the leg from obstruction of the crural vein by a thrombus." But one can

¹ 'A Text-book of Practical Medicine,' vol. i, pp. 624 and 650.

scarcely deny the very obvious sequence of cause and effect in these cases, so far, at least, as mere diuresis is concerned.

But the permanent benefit to be derived from the treatment might well stand in question some time longer, to judge alone from the cases here recorded. Excluding the case of the child (No. 9) as of doubtful nature, we find that in four cases (Nos. 1, 2, 3, 8) the subsidence of the dropsy was succeeded by fatal coma; twice accompanied by delirium, and twice preceded by more or less abundant hæmatemesis; and in an equal number only (Nos. 4, first illness, 5, 6, 7) was the ascites relieved without any untoward symptom. Of the three cases in which copaiba had little effect two were submitted to paracentesis, and died after a short time with coma and delirium (Nos. 11, 13), while I have references to three other fatal cases of cirrhosis of the liver, not included in the present list, in which copaiba resin was given for too short a time to draw any conclusions from. Indeed, cirrhosis of the liver as it comes before us in hospital practice, in its advanced stage, with ascites fully developed, is a very fatal and intractable disorder.

The condition of the kidneys is of interest in a disease in which one looks to them for an increased performance of function; and it appears that in all the cases in which diuresis was effected, and in one of those in which it was not, the kidneys were practically healthy. I may refer to the notes of the anatomical condition of the organs in the fatal cases, and the observations on the urine in the cases which recovered. The exceptional cases are, No. 11, in which the kidneys were congested and weighed 19 ounces, and No. 12, in which the urine was, on admission, of sp. gr. 1014, and contained a trace of albumen.

CASE 1.—Ascites ; cirrhosis of the liver ; death.

Sarah G—, æt. 49, was admitted under the care of Dr. F. Taylor, June 3rd, 1874. The present illness commenced eighteen months ago with swelling of the abdomen and vomiting of blood. Three weeks ago her legs swelled.

On admission she was suffering from ascites, the abdomen measuring forty-five and a half inches in circumference at the level of the umbilicus; the feet and legs were

œdematous. Pulse 90; resp. 24; temp. 99·2°. She passed 20 ounces of urine in twenty-four hours, of sp. gr. 1010, and not albuminous. She was ordered an ounce of Mistura Copaibæ Resinæ three times a day.

The daily quantity of urine during the administration of the resin was as follows :

June 4	. 20 ounces, sp. gr. 1010	June 17	. . . 76 ounces.
" 5	. 28 " " 1010	" 18	. . . 86 "
" 8	. 40 " " 1010	" 19	. . . 116 "
" 9	. 50 " " 1010	" 20	. . . 88 "
" 10	. 56 " " 1010	" 21	. . . 84 "
" 11	. 76 " " 1008	" 22	. . . 70 "
" 12	. 83 " " 1004	" 24	. . . 76 "
" 13	. 88 "	" 25	. . . 84 "
" 14	. 46 "	" 26	. . . 80 "
" 15	. 46 "	" 28	. . . 80 "
" 16	. 47 "	July 2	. . . 60 "

On June 15th the abdomen measured thirty-eight inches, and on June 19th the liver was easily felt below the ribs.

On the 21st the œdema of the legs had subsided, and on the 25th she was up for a short time. On this date she passed some blood in her motions, and she subsequently had both epistaxis and hæmatemesis.

On July 1st the copaiba was discontinued and from then till her death on July 17th she was in a very prostrate condition, with hæmatemesis, bleeding from the gums, and ecchymosis on the hands and abdomen. She rallied for a time, but soon sank into a comatose condition, from which she did not recover.

Post-mortem.—Heart and lungs healthy. Liver 47 ounces, greatly indurated, pale yellow on section, scarcely any hepatic tissue being visible. Spleen 4½ ounces. Kidneys 10½ ounces, the surfaces uneven, but the tissue healthy.

CASE 2.—*Ascites; cirrhosis of the liver; left pleural effusion; death.*

James C—, æt. 58, was admitted under Dr. Moxon's care, October 23rd, 1874. He has had for about six months symptoms referable to disturbance of the liver; once or twice

he noticed swelling of the abdomen, and of the feet and legs; his urine was scanty and high coloured. Varying for some time the swelling at length rapidly increased, and three gallons of fluid were removed by paracentesis on October 4th. The fluid quickly returned, and on admission his abdomen measured forty-six and a half inches at its most prominent part; the liver could not be felt; the legs were œdematous; the urine high coloured, but not albuminous. Pulse 104, small, compressible; resp. 32.

On October 24th he was ordered *Mist. Copaibæ Resinæ* ʒj t. d. s.

October 24 . 20 ounces, sp. gr. 1030	October 28 . . . 60 ounces.
" 26 . 40 " " 1016	" 29 . . . 74 "
" 27 . 56 " " 1010	" 30 . . . 96 "

On October 27th a small quantity of albumen was present in the urine, the legs were more swollen, the left arm dropsical, the left pleura contained fluid, but the abdomen was less tense.

On October 29th he was irritable.

On the 30th he was delirious, and the breathing becoming more difficult he sank into an unconscious state, in which he died on October 31st.

Post-mortem.—Liver 46 ounces, very granular, the section so hard that the finger could not be pushed through it. Spleen 11 ounces. Kidneys 16 ounces, very congested and tough, the cortex to all appearance normal. Heart 12 ounces. Left lung collapsed from pressure of fluid in the pleural cavity.

CASE 3.—*Ascites; cirrhosis of the liver; hæmatemesis; death.*

Alfred H—, æt. 18, was admitted into Clinical Ward, under Dr. Fagge, July 20th, 1874. The patient had been losing flesh for about three months, and four or five weeks ago noticed that his abdomen was swelling.

On admission the abdomen measured thirty-three and a half inches above the crista ilii, and thirty-seven and a half inches below the false ribs. The liver could be felt on deep palpation, and the heart beat in the fourth interspace. He said he only

passed two or three teaspoonfuls daily. Pulse 108, resp. 38. Ordered Mist. Copaibæ Resinæ ʒj t. d.

July 21 . .	21 ounces, sp. gr. 1010	July 28 . . .	70 ounces.
" 22 . .	68 "	" 29 . . .	88 "
" 23 . .	69 " " 1008	" 30 . . .	90 "
" 24 . .	80 "	" 31 . . .	70 "
" 25 . .	90 "	August 1 . . .	100 "
" 26 . .	86 "	" 2 . . .	90 "
" 27 . .	80 "		

During this time the abdomen diminished in size rapidly, measuring three inches less on July 30th than it did on admission. His bowels were generally confined, and from this date he began to vomit blood. The hæmatemesis was abundant on August 2nd, and on the following day, after bringing up a large quantity of blood, he became gradually comatose, and died in the evening.

Post-mortem.—Liver 64 ounces, exceedingly hard and nodulated, its section dry, and of mottled white and yellow colour. Stomach full of dark clot. Spleen 10 ounces, flaccid, and rather pale. Kidneys 9 ounces, healthy.

CASE 4.—*Ascites and anasarca ; emphysema and dilated heart ; thickening of capsules of liver and spleen ; temporary relief ; death.*

Philip R—, æt. 50, was admitted under Dr. Moxon's care December 31st, 1873. Six months previously he had noticed dyspnœa and swelling of the feet ; then his abdomen enlarged, and he lost flesh.

On admission he had anasarca of the lower half of the body, ascites, with evidence of emphysema of the lungs, and great enlargement of the heart.

On January 5th paracentesis was performed, and seven pints of fluid were removed.

On January 15th he was ordered—

R. Copaibæ Resinæ, ʒj ;
Mucilaginis Tragacanthæ, ʒij ;
Ex Infus. Rosæ Acidi, ʒj ; ter die sum.

He passed on

January 10 . 42 ounces, sp. gr. 1018	January 26 . 80 ounces, sp. gr. 1012
" 11 } . 88 " " 1022	" 27 . 80 " " 1012
" 12 } . 88 " " 1022	" 28 . 60 " " 1012
" 15 . 48 " " 1012	" 29 . 76 " " 1011
" 17 . 96 " " 1012	" 30 . 86 " " 1010
" 18 . 96 " " 1010	" 31 . 80 " " 1010
" 19 . 86 " " 1010	February 1 . 50 " "
" 20 . 86 " " 1010	" 2 . 56 " " 1012
" 21 . 72 " " 1014	" 3 . 41 " " 1016
" 22 . 90 " " 1010	" 4 . 32 " " 1015
" 23 . 86 " " 1010	" 5 . 34 " " 1017
" 25 . 96 " "	

The copaiba mixture had been omitted on January 30th, but was resumed on February 5th.

February 6 . 60 ounces, sp. gr. 1012	February 10 . 68 ounces, sp. gr. 1012
" 7 . 64 " " 1012	" 11 . 80 " " 1012
" 8 . 80 " " 1010	" 12 . 88 " " 1010
" 9 . 76 " " 1010	" 13 . 66 " " 1010

During this time the dropsy both of the abdomen and legs steadily diminished, and he got up on February 14th. After this the urine was not measured, but its specific gravity was mostly 1010 or 1012, and on March 11th he was discharged well.

He was admitted again under Dr. Hilton Fagge's care with a similar train of symptoms October 26th, 1874. In addition he had moist bronchitic râles over the whole chest, and a systolic murmur was audible at the apex and posteriorly. The following day Mist. Copaibæ Resinæ was given three times a day, and he passed on—

October 29 . 16 ounces, sp. gr. 1020	November 3 . 38 ounces, sp. gr. 1018
" 30 . 30 " " 1020	" 4 . 20 " " 1020
November 1 . 40 " " 1018	" 7 . 30 " " 1020
" 2 . 38 " " 1018	

On the 5th his legs were punctured, but the dyspnœa increased, blood was expectorated with the sputa, delirium supervened, and he died November 10th.

Post-mortem.—Liver much altered in shape by a thickened and contracted capsule, extremely nutmegged on section, but not tough, as in cirrhosis. Heart of immense size, weighing

33 ounces, both ventricles dilated and hypertrophied, and the mitral valve apparently incompetent. Spleen 8 ounces, with a thick capsule and recent embolic infarctions. Kidneys 16 ounces, slightly granular on the surface; the cortex normal, but showing recent emboli.

CASE 5.—*Ascites; cirrhosis of the liver; relief.*

Richard G—, æt. 41, was admitted under Dr. Wilks, September 8th, 1874. The patient was a farmer, had lived freely and drunk spirits. Four years ago he began to have constantly recurring bilious attacks and rheumatic pains in the hips. Three weeks ago, after getting wet through, found difficulty in walking from the swelling of his legs and abdomen; his urine was then dark.

On admission his abdomen contained fluid and measured forty-seven inches. By deep palpation the liver could be felt, and its surface appeared to be rough. The cardiac impulse was slight, the sounds normal. Pulse 64, resp. 24. The urine was clear, dark coloured, of sp. gr. 1026.

On September 10th he was ordered Mist. Cop. Resinæ ʒj t. d. The effect on the urine was as follows :

Sept. 10, 18 oz., Abd. measured 47 in.	Sept. 24, 72 oz.
" 11, 76 "	" 25, 64 "
" 12, 68 " " 45½ "	" 26, 60 "
" 13, 68 "	" 27, 56 "
" 14, 68 "	" 28, 60 "
" 15, 68 " " 43½ "	" 29, 64 " Abd. measured 89½ in.
" 16, 78 "	" 30, 66 "
" 17, 75 " " 42½ "	Oct. 1, 70 "
" 18, 78 "	" 2, 64 "
" 19, 78 "	" 3, 60 "
" 20, 72 "	" 4, 56 "
" 21, 68 "	" 5, 60 "
" 22, 50 " " 42 "	" 6, 70 "
" 23, 60 "	" 7, 74 "

The medicine was omitted on October 5th, and he left on the 9th, his abdomen then measuring 38½ inches.

CASE 6.—*Ascites ; cirrhosis of the liver ; relief.*

George B—, æt. 38, was admitted under Dr. Wilks, October 13th, 1875. He had always drunk beer freely until the occurrence of an accident ten years ago, since which time he has been more moderate. Two months ago he had shooting pains in the back, was obliged to give up work, and the scrotum and abdomen swelled ; the swelling subsided for a time under treatment, but shortly recurred.

On admission the abdomen, penis, and scrotum were swollen, as well as the ankles, legs, and thighs, to a less extent. Hepatic dulness reached from the fifth rib to the costal margin. The *Mistura Copaibæ Resinæ* was ordered on the 15th, and the swelling rapidly subsided, but he left the hospital six days later on account of his dislike to the medicine. He passed on

October 14	.	70 ounces.		October 18	.	126 ounces.
" 15	.	60 "		" 19	.	148 "
" 16	.	122 "		" 20	.	140 "
" 17	.	116 "				

CASE 7.—*Ascites ; cirrhosis of the liver ; relief.*

Naomi L—, æt. 51, was admitted under Dr. Pavy, February 4th, 1874. She was well till twelve months previously, when she noticed puffiness of the face and swelling of the feet towards the evening.

On admission she had ascites and œdema of the legs ; the liver was felt extending far into the abdomen ; the skin and conjunctivæ were jaundiced ; a systolic bruit was audible at the base of the heart. The urine had a sp. gr. of 1022, and was not albuminous. Iron and quinine, and subsequently digitalis, squills, and mercury were given, and the swelling of the legs diminished ; but on March 6th it was noted that her legs were again swelled, and there appeared to be a considerable amount of fluid in the abdomen. Her urine averaged one and a half pints daily. She was ordered *Mist. Copaibæ Resinæ* ʒj t. d. s.

On March 12th the œdema of the legs was less, the abdomen

was not so tense, and the liver was easily felt below the ribs. The daily quantity of urine had risen to four pints.

On the 25th she went out pretty well, but the report makes no further mention of the quantity of the urine.

CASE 8.—*Ascites ; cirrhosis of the liver ; death.*

Uriah W—, æt. 63, was admitted under Dr. Hilton Fagge, October 2nd, 1874. He said he had always been well until the present illness. The abdomen, which had been enlarging for only two weeks, measured forty inches at its greatest circumference, midway between the umbilicus and the ensiform cartilage ; the surface of the liver could be felt on deep palpation. The urine was neutral in reaction, of sp. gr. 1012, and free from albumen and sugar.

On October 3rd he was ordered Pulv. Jalapæ Co. ʒss, alterno mane, and the report states that he passed five pints of urine on the day after his admission.

On the 6th *Mistura Copaibæ Resinæ* ʒj t. d. was ordered, and continued until October 17th.

The urine measured on

October 8	.	100 ounces.	October 12	.	80 ounces.
" 9	.	110 "	" 14	.	90 "
" 10	.	60 "			

During these days his abdomen diminished in size, but he became weaker, lost appetite, and began to doze.

On the 15th he was sleeping all day, and from this date he continued to be drowsy during the day, restless and delirious, even violently so, at night, passing urine and fæces in the bed, and complaining more or less of pain in the abdomen.

On the 29th an entirely farinaceous diet was ordered, with six ounces of gin, and soda water.

On November 7th he was semi-comatose, and in spite of purgatives became more deeply insensible, and died November 8th.

Post-mortem.—Liver 51 ounces, showing an extreme degree of cirrhosis. Heart.—Muscular tissue soft, in a state of brown atrophy. Kidneys 12 ounces, healthy.

CASE 9.—*Ascites and enlarged liver; relief.*

George C. S—, æt. 6½ years, was admitted under Dr. Hilton Fagge, July 15th, 1874. He had suffered from jaundice at sixteen months old, from scarlatina nine months before admission, and the present ascites appeared with œdema of the legs in February, 1874.

On admission the abdomen measured twenty-six inches; the liver reached within two inches of the umbilicus and to the left mammary line, its surface being smooth. The urine was dark in colour and not albuminous. He was ordered to take—

Potassii Iodidi, gr. v;
Syrupi Aurantii, ʒss;
Ex Aquæ, ʒij, t. d.

On the 23rd the abdomen was larger, and the legs were more œdematous.

On the 27th he was ordered two drachms of the copaiba resin mixture three times a day.

He passed on—

July 30	30 oz.	Aug. 2	28 oz.	Aug. 5	34 oz.
" 31	28 "	" 3	32 "	" 6	36 "
Aug. 1	28 "	" 4	34 "	" 7	28 "

Though the urine was abundant the dropsy scarcely diminished; he was therefore ordered iodide of potassium with syrup of iodide of iron. But the copaiba was again given on August 22nd in doses of ʒij three times a day; this was increased to half an ounce on September 5th. The abdomen now began to diminish slowly in size, being twenty-four and a half inches on the 6th, twenty-four on the 10th, and twenty-one and a quarter on the 16th.

The urine measured on—

Sept. 10	40 oz.	Sept. 11	44 oz.	Sept. 12	42 oz.
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On the 18th he went out.

CASE 10.—*Ascites; cirrhosis of the liver; death.*

Thomas C—, æt. 45, was admitted under Dr. Moxon, June 9th, 1875. His illness dated from last February, when he had

pain in the back and chest; he was laid up for a month, and improved, but was again confined to his bed for a fortnight. Eight weeks before admission he had hypogastric pain and loss of appetite, and after five or six weeks his abdomen began to swell.

On admission his abdomen measured forty-two inches in circumference, and the liver was felt to be increased in size; the urine was high coloured, of sp. gr. 1030, and free from albumen. The observations on his condition may be tabulated as follows:

June 11	...	—	...	—	...	Ordered copaiba resin.
" 12	...	38 ounces.				
" 13	...	28 "				
" 14	...	24 "				
" 15	...	—	...	—	...	Fluid food stopped.
" 16	...	40 "				
" 17	...	12 "				
" 18	...	14 "	...	—	...	Half pint of milk allowed.
" 19	...	32 "				
" 20	...	40 "				
" 21	...	40 "	sp. gr. 1010	...		Paracentesis abdominis.
" 22	...	16 "				
" 23	...	46 "				
" 24	...	30 "	"	1014		
" 25	...	32 "				
" 28	...	34 "	"	1010	...	{ Iodide and bromide of potassium in infusion of cinchona.
" 30	...	18 "				
July 1	...	40 "				
" 2	...	14 "				
" 14	...	—	"	—	...	Paracentesis abdominis.
" 17	...	—	"	—	...	Mist. copaib. resin, 3j, t. d.
" 23	...	64 "	"	1018		
" 24	...	46 "	Aug. 4	36 oz.		Aug. 11 34 oz.
" 26	...	48 "	" 6	38 "		" 12 32 "
" 28	...	30 "	" 7	36 "		" 13 46 "
" 31	...	46 "	" 8	32 "		" 14 38 "
Aug. 1	...	48 "	" 9	46 "		" 15 34 "
" 2	...	34 "	" 10	38 "		

On August 16th the copaiba was omitted, and a mixture containing taraxacum juice, spirits of juniper, and dilute hydrochloric acid was given three times a day.

On the 23rd he was ordered cream of tartar in water as a drink, and on the 26th lemon juice.

Aug. 27 . 32 ounces.		Sept. 2 . 64 ounces, sp. gr. 1007
" 28 . 34 "		" 3 . 60 "
" 29 . 36 "		" 4 . 50 "
" 30 . 32 "		" 5 . 52 "
" 31 . 54 "	sp. gr. 1008	" 6 . 56 "
Sept. 1 . 60 "		" 7 . 44 "

During these last days the abdomen diminished rapidly in size, but there was at the same time considerable wasting of the whole frame.

On September 9th diarrhoea set in, and on the 15th the patient sank.

Post-mortem.—Liver 48 ounces, cirrhotic. Spleen very large, normal in structure. Many peritoneal adhesions. Kidneys healthy.

CASE 11.—*Ascites ; cirrhosis of the liver ; death.*

Robert J—, set. 46, was admitted under Dr. Wilks, September 3rd, 1874. He had been unwell nine months, and had noticed swelling of the abdomen four months.

On admission it measured forty-nine inches in circumference, and fluctuation was perceptible ; the liver could not be felt, the heart beat in the fourth space ; pulse 132 ; resp. 28 ; temp. 98° ; urine scanty, dark, of sp. gr. 1028, and free from albumen.

On September 7th he was ordered acetate and iodide of potassium in Decoctum Scoparii, and Linimentum Hydrargyri was applied to the abdomen.

14th.—He took Mist. Copaibæ Resinæ ʒj t. d.

In the following table the small amounts of the first few days are accounted for by what he passed with his motions.

Sept. 11	8 oz.	Sept. 16	30 oz.	Sept. 21	28 oz.
" 12	7 "	" 17	31 "	" 22	40 "
" 13	3½ "	" 18	16 "	" 23	28 "
" 14	4 "	" 19	38 "	" 24	4 "
" 15	16 "	" 20	32 "		

On the 21st three and a half gallons of ascitic fluid were

removed by paracentesis. Restlessness, delirium, and coma followed, and he died September 25th, 1875.

Post-mortem.—Liver 62 ounces, much cirrlosed, and very fatty. Heart healthy. Spleen large and firm, 10 ounces. Kidneys 19 ounces, congested. Lungs loaded with blood, the small bronchial tubes containing pus.

CASE 12.—*Ascites ; cirrhosis of the liver ; relief.*

James D—, æt. 54, was admitted under Dr. Hilton Fagge, April 14th, 1875. He had been subject to œdema and ulceration of the legs for a long period, but his abdomen began to swell five weeks before admission, and the dyspnœa following this necessitated his taking to his bed.

The abdomen measured forty inches in circumference, and the liver was not perceptible; the urine had a sp. gr. of 1014, and showed a faint trace of albumen. Paracentesis abdominis was immediately performed.

On the 20th his abdomen measured thirty-seven and a half inches, and on the 22nd he was ordered digitalis, squill, and spirits of nitre.

He passed on—

April 21	26 oz.	April 26	34 oz.	May 2 }	40 oz.
" 22	22 "	" 27	27 "	" 3 }	
" 23	23 "	" 28	32 "	" 4	30 "
" 24	24 "	" 29	20 "	" 5	35 "
" 25	34 "	May 1	20 "	" 6	20 "

On this day *Mistura Copaibæ Resinæ* was ordered; the abdomen had already diminished to thirty-five inches.

May 7	20 oz.	May 10	10 oz.	May 15	16 oz.
" 8	22 "	" 11	20 "	" 18	16 "
" 9	4 "	" 14	20 "		

The abdomen measured thirty-three inches on the 14th; thirty-two and a half on the 17th; and thirty-two on the 18th May, when he left the hospital.

CASE 13.—Ascites ; cirrhosis of the liver and perihepatitis ; death.

Robert R—, æt. 40, was admitted under Dr. F. Taylor, May 7th, 1875. His illness began in November, 1874, with dyspnœa and cough, since which he has had bilious attacks and vomiting, then jaundice. The abdomen, which had been enlarging sixteen days, was, on admission, thirty-seven and a half inches in circumference ; the edge of the liver could not be felt ; the urine was high coloured, tinged with bile pigment, of sp. gr. 1022, and free from albumen.

On May 8th he was ordered Mist. Copaibæ Resinæ ʒj t. d.

On the 10th he was tapped and six pints of fluid removed ; the copaiba resin was resumed the next day, but again discontinued on May 15th. Four days later paracentesis was again performed and twelve pints removed. Coma, however, supervened, and he died May 21st.

He passed on—

May 9 . . .	30 ounces.	May 16	10 ounces
" 10 . . .	48 "	" 17	30 "
" 12 . . .	32 " sp. gr. 1015	" 18	30 "
" 13 . . .	28 "	" 19	32 "
" 14 . . .	20 " " 1015	" 20	8 "
" 15 . . .	24 "		

Post-mortem.—Brain, heart, spleen, kidneys healthy. Liver exceedingly congested, with much fibrous tissue, evenly distributed. Capsule much thickened ; the liver also contained a nodule, which appeared to be syphilitic. Lungs emphysematous, with yellow cheesy masses scattered through them. The testes also contained syphilitic gummata.

CHRONIC ABDOMINAL EFFUSION.

In the only case of this kind, in which the resin of copaiba has been tried, it proved to be of little value. On one day the quantity of urine was unusually high (76 ounces), but only on two other occasions was it more abundant than it had been before the administration of the drug. As no effect upon the effusion was perceptible, the medicine was discontinued after a

fortnight's trial; and after the application of Unguentum Hydrargyri had also failed to bring about absorption of the fluid, the aspirator was used with complete success.

CASE 14.—Chronic abdominal effusion of three years' duration.

Richard R—, æt. 10, was admitted under Dr. Hilton Fagge, March 27th, 1874. The boy was in Guy's on two previous occasions, in 1871 and 1872, for the same complaint, but went out with very little benefit from treatment: the abdomen was found to contain fluid, but the health of the boy was unaffected by its presence. During the last six months he has passed more water than before.

On admission he is a pale strumous-looking boy, but feels perfectly well. The abdomen contains much fluid, measures twenty-seven and a half inches in circumference; dulness is pretty universal, and the superficial veins are distended. The viscera appear normal, and there is no œdema. The urine is pale, of sp. gr. 1007, not albuminous.

April 2nd.—He was ordered Mist. Copaibæ Resinæ, ℥ss, ter die; but for the first few days, on account of his being sick, the urine was not measured.

He passed on

March 31	.	.	.	46 ounces.	April 2	.	.	28 ounces, sp. gr. 1018
April 1	.	.	.	40 "				

Copaiba mixture ordered.

April 8	35 oz.	April 14	76 oz.	April 19	36 oz.
" 10	20 "	" 15	38 "	" 20	55 "
" 11	40 "	" 16	22 "	" 22	55 "
" 12	40 "	" 18	35 "	" 23	32 "
" 13	38 "				

On the 25th the copaiba was discontinued, no influence on the abdominal effusion being perceptible.

The abdomen was subsequently covered with Unguentum Hydrargyri, but it still measured twenty-five inches on the 23rd of May. At the suggestion of Dr. Fagge, Mr. Howse was asked to see the case, with the view to removing the fluid by operation: the remainder of the report runs as follows:—

May 29th.—Mr. Howse used the aspirator yesterday after-

noon, and removed thereby five pints sixteen ounces of fluid, as much being removed as would come out. At the end of the operation the abdomen was resonant over its whole surface. The fluid as it was withdrawn was straw-coloured, not so viscid as most ascitic fluids, and contained a number of cholestearine crystals floating in it; its reaction was alkaline, its specific gravity 1018, and it became nearly solid on boiling and adding acetic acid. This morning the boy has no pain nor any febrile symptom.

May 30th.—The abdomen is quite resonant and free from pain.

June 1st.—The abdomen is very flaccid, like a partially filled bag, and bulges towards the dependent side when he is turned over: slight fluctuation is perceptible, and as he lies on his back there is dulness to the left of the middle line, from the groin upwards to a line drawn from the umbilicus to the margin of the ribs.

June 8rd.—Goes out to-day.

When seen again at the end of September his abdomen was quite free from fluid.

CARDIAC DROPSY.

This group is especially interesting because the cases included in it offered numerous opportunities of comparing the relative effects of digitalis and copaiba. Often, indeed, they were given in combination, and in one case (No. 22), where this was the only medicine administered, the diuretic effect cannot with certainty be ascribed to either: in most cases, however, digitalis was given at some period, either alone or in combination with squill, nitrous ether, &c., and the advantage derivable from the addition of copaiba resin was very obvious. Instances of this may be seen in Case 17, where for the first *nine* days, during the use of digitalis, the daily urine averaged 23 ounces, but increased rapidly on the addition of copaiba resin to 90, 100, and 125 ounces, making an average of 77 ounces during the next period of nine days, or an average of 69 ounces for the whole period of 39 days; and in Case 16, where the urine increased to 110 and 120 ounces under digitalis and Resina Copaibæ, fell quickly to 40, 20, and 16, when

the latter was discontinued, and rose again to 80, when it was again employed. Examples of the different effects of the two drugs, when given separately, are afforded by Case 15, where digitalis was given at first with little relief, and by Case 21, if the middle period, June 2nd to June 8th, be compared with the period of eight days preceding it and that of thirteen days following it, though only during a part of this last was digitalis taken.

Of the fourteen cases included in this group of cardiac disease the diuretic effect was well marked in seven (Nos. 15—21): in two of these (Nos. 19 and 20) there is no record of the condition of the urine under other treatment than the copaiba resin; but in the five remaining cases the urine was measured for longer or shorter periods, while this drug was omitted or others were substituted for it. The influence of the resin is in this respect well shown in Case 18. On six days between March 9th and March 18th, during which he was taking copaiba, he passed respectively 100, 120, 110, 108, 104, and 110 ounces, giving a daily average of 110: on the eight following days he passed respectively 64, 60, 66, 40, 40, 38, 30, and 26 ounces, a daily average of 45; and on the next seven days, March 27th to April 2nd, he passed during the administration of the resin 44, 80, 100, 100, 110, 120, and 112, a daily average of 95.

Cases 21, 16, 15, and 17, have already been instanced as illustrating the same point; but the last mentioned deserves a closer analysis, as the observations made on it extend over a period of more than a year, during nearly the whole of which the urine has been measured, and the resin of copaiba has been repeatedly taken for several days in succession. The time of observation may be divided into eleven periods; of which five, during which copaiba was given, alternate with six in which it was omitted, and some other treatment was employed. As may be seen by reference to the figures, the quantities passed during a long period vary very much, and the fluctuations on either side of the average are considerable: but the difference between the averages of the various periods is too great to be compensated for by this fluctuation, except towards the end of the observation, where it will be seen that two of the means very closely agree. The periods during which the resin was not taken are:—the first, of 9 days, with an average of 28

ounces; the third, of 33 days, with an average of 34 ounces; the fifth of 14 days, with an average of 34 ounces; the seventh of 15 days, with an average of 31·4 days; the ninth of 23 days, with an average of 46 ounces; and the eleventh of 50 days, with an average of 21 ounces. The alternate periods during which copaiba was being taken are:—the second, of 39 days, with an average of 69 ounces; the fourth, of 25 days, with an average of 69 ounces; the sixth of 38 days, with an average of 50 ounces; the eighth of 30 days, with an average of 56 ounces; and the tenth of 32 days, with an average of 47 ounces. They may be tabulated for comparison thus:—

Periods . . .	1	2	3	4	5	6	7	8	9	10	11	General average.
Days . . .	9	39	33	25	14	38	15	30	23	32	50	...
Without resin	23	...	34	...	34	...	31·4	...	46	...	21	33
With resin .	...	69	...	69	...	50	...	56	...	47	...	58

Of the remaining seven cases one (No. 22) has been already referred to as of doubtful value because the copaiba was given in combination with digitalis. In another (No. 23) the result was not very decided, but the medicine had to be administered in small doses on account of repeated sickness; and in the last five cases the drug appeared to have little, if any, influence upon the secretion of the urine. It must be confessed that in none of these have the results been so carefully watched and recorded as in the cases already considered; but the absence of record is of itself a kind of evidence that the quantity of urine was not increased in a striking degree. In two cases (Nos. 24 and 26) the patient was only for a few days before death submitted to the influence of the resin, and therefore one would hesitate to draw any conclusions from them with regard to its efficacy, but in the other three (Nos. 25, 27, and 28), as well as in one of the above (No. 26), a condition was present which at once suggests itself as a probable cause of the failure of the diuretic. All of these terminated in death, and in all the kidneys were found to be affected with Bright's disease. In Case 25 the kidneys were "very uneven on the surface,

mottled, and evidently affected with advanced (fatty) degeneration." In Case 26 the surface was granular, and the cortex much wasted. In Case 27 they were slightly granular, presented an opaque yellow mottling, without wasting of the cortex; and in Case 28 they were very granular, with adherent capsule, wasted cortex, and many points of fatty inflammatory degeneration. These results may be compared with those of Case 15, where the kidneys were congested but apparently healthy; and of Case 22, in which they were only large, indurated, and glistening.

CASE 15.—Aortic disease; enlarged liver; dropsy.

Charles R.—, æt. 36, was admitted under Dr. Moxon, March 25th, 1874. He was in the hospital eight months previously with œdema of the legs, enlarged heart, and double aortic murmur. On this occasion he had orthopnœa, cough, dropsy, and slight jaundice; the apex of the heart beat in the sixth space, one inch external to the nipple, and a double bruit was audible over the aortic valves. The abdomen contained fluid, and the liver was felt four inches below the ribs in the mammary line; the legs were œdematous; the urine scanty and albuminous; the pulse 104, splashing. Digitalis, nitrous ether, squill, and purgatives were ordered, but with little relief.

On April 11th he took Mist. Copaibæ Resinæ ʒj t. d.

He passed on

April 11	40 oz.	April 29	182 oz.	May 11	60 oz
" 12	70 "	May 1	115 "	" 14	68 "
" 13	80 "	" 3	140 "	" 15	50 "
" 15	44 "	" 4	124 "	" 16	60 "
" 16	60 "	" 5	128 "	" 19	44 "
" 18	64 "	" 6	110 "	" 22	48 "
" 22	68 "	" 7	100 "	" 23	60 "
" 25	100 "	" 9	120 "	" 28,	" passes 6 or 7
" 28	124 "				pints of urine in the day."

On May 4th the œdema of the legs had subsided; the medicine was discontinued on May 11th, and resumed May 20th.

On June 13th he left for a convalescent home.

On readmission July 13th, the feet, legs, and abdomen being again swollen, he was immediately ordered to take *Mistura Copaibæ Resinæ*, and with the exception of a few short intervals he continued to take the same medicine until within five days of his death, a period of nearly four months.

The daily quantity of urine passed was as follows :

July 20	86 oz.	Aug. 26	110 oz.	Oct. 2	115 oz.
" 21	110 "	" 27	100 "	" 3	112 "
" 22	124 "	" 28	86 "	" 4	82 "
" 23	128 "	" 29	84 "	" 5	72 "
" 24	131 "	" 30	88 "	" 6	90 "
" 25	128 "	" 31	86 "	" 7	90 "
" 26	130 "	Sept. 1	108 "	" 8	90 "
" 27	136 "	" 2	96 "	" 9	90 "
" 28	139 "	" 3	86 "	" 10	90 "
" 29	82 "	" 4	82 "	" 11	88 "
" 30	60 "	" 5	80 "	" 12	88 "
" 31	66 "	" 6	80 "	" 13	86 "
Aug. 1	56 "	" 7	80 "	" 14	80 "
" 2	74 "	" 8	80 "	" 15	80 "
" 3	86 "	" 9	80 "	" 16	80 "
" 4	80 "	" 10	80 "	" 17	80 "
" 5	78 "	" 11	82 "	" 18	80 "
" 6	80 "	" 12	81 "	" 19	80 "
" 7	78 "	" 13	90 "	" 20	80 "
" 8	66 "	" 14	86 "	" 21	90 "
" 9	80 "	" 15	70 "	" 22	95 "
" 10	96 "	" 16	74 "	" 23	98 "
" 11	108 "	" 17	62 "	" 24	106 "
" 12	106 "	" 18	62 "	" 25	106 "
" 13	101 "	" 19	64 "	" 26	104 "
" 14	108 "	" 20	87 "	" 27	108 "
" 15	108 "	" 21	93 "	" 28	108 "
" 16	96 "	" 22	106 "	" 29	108 "
" 17	90 "	" 23	115 "	" 30	108 "
" 18	94 "	" 24	120 "	" 31	108 "
" 19	96 "	" 25	104 "	Nov. 1	108 "
" 20	96 "	" 26	114 "	" 2	96 "
" 21	90 "	" 27	101 "	" 3	85 "
" 22	108 "	" 28	114 "	" 4	60 "
" 23	108 "	" 29	114 "	" 5	50 "
" 24	110 "	" 30	70 "	" 6	54 "
" 25	117 "	Oct. 1	74 "		

From July 27th to August 1st he took a mixture containing

tincture of tolu, mucilage, and glycerine, and between the 10th and 18th of September the following was prescribed :

R. Sp. Æth. Nit., ʒss;
Tinct. Scillæ, ℥x;
Inf. Senegæ, ad ʒj. Ter die sum.

A third interval was from the 19th to the 22nd of October, during which time twenty minims of liquor morphiæ hydrochloratis and ten of dilute nitric acid were given, with syrup of lemons three times daily. During August the ascites diminished considerably, but it again increased in September, and he suffered from dyspnœa, headache, and giddiness. His symptoms continued with varying intensity during October, but in the first week of November he had an attack of erysipelas of the face and neck, and he died on the 9th of that month.

Post-mortem.—Lungs showing some degree of brown induration, and a state approaching that of apoplexy. Heart 23 ounces, all the cavities dilated and hypertrophied. The aortic valves allowed free regurgitation; the left anterior valve was reduced to a mere relic, its anterior end not reaching the point of attachment of the adjacent valve. Aortic coats somewhat thickened in patches. Mitral valve healthy. Liver 84 ounces, nutmegged; capsule thick, opaque, areolated. Kidneys 15 ounces, congested, but apparently healthy. Spleen 18 ounces, hard, its capsule similar to that of the liver.

CASE 16.—*Aortic disease; ascites; anasarca.*

Norton W—, æt. 39, was admitted under Dr. Moxon, July 14th, 1875. He had had rheumatic fever on three occasions, the last time eleven months ago. Since Christmas his legs had begun to swell, and three weeks ago his abdomen enlarged.

On admission he was suffering from ascites and anasarca, the heart was enlarged, and a systolic murmur was audible over the præcordia and in the axilla. The pulse was irregular and feeble; the urine clear, high coloured, of sp. gr. 1016, and free from albumen.

On July 15th he was ordered—

Tr. Digitalis, ℥viij;
Ex Mist. Copaibæ Resinæ ʒj t. d.

On the 17th the digitalis was increased to twelve minims.

On the 20th twelve minims of digitalis were given, with tincture of capsicum and syrup of ginger instead of copaiba resin.

On the 24th the resin was again ordered, with five drops of digitalis. After three days it was replaced by a mixture containing Tr. Benzoin. Co., and on August 1st the copaiba resin with five drops of digitalis was given. This was continued twice or thrice daily, with a purgative pill at night, until the departure of the patient. He left the hospital on August 31st relieved, but still with a considerable amount of ascites.

He passed on—

July 16	40 oz.			Aug. 8	60 oz.	0 motions.	2 doses.
" 17	93 "			" 9	52 "	3 "	2 "
" 18	123 "			" 10	64 "	2 "	3 "
" 19	112 "			" 11	112 "	3 "	3 "
" 20	80 "			" 12	58 "	2 "	2 "
" 21	44 "			" 13	72 "	2 "	3 "
" 22	68 "			" 14	88 "	1 "	3 "
" 23	25 "			" 15	60 "	1 "	2 "
" 24	16 "			" 16	60 "	2 "	
" 26	80 "			" 17	52 "	3 "	
" 27	80 "			" 18	62 "	2 "	
" 28	26 "	3 motions.		" 19	58 "	2 "	
" 29	23 "	3 "		" 20	76 "	2 "	
" 30	20 "	2 "		" 21	66 "	2 "	
" 31	33 "	2 "		" 22	62 "	3 "	
Aug. 1	46 "	2 "	1 dose.	" 23	64 "	3 "	
" 2	88 "	3 "	3 doses.	" 24	66 "	2 "	
" 3	78 "	2 "	2 "	" 25	70 "	3 "	
" 4	84 "	2 "	2 "	" 26	90 "	3 "	
" 5	78 "	2 "	2 "	" 27	82 "	3 "	
" 6	68 "	1 "	3 "	" 28	80 "	2 "	
" 7	88 "	1 "	2 "				

CASE 17.¹—*Mitral constriction ; dropsy ; hepatic pulsation.*

Charles H—, æt. 20, was admitted under Dr. Moxon's care,

¹ This patient's case, apart from the condition of the urine, is more fully described in a paper on "Pulsation of the Liver," in the 'Guy's Hospital Reports,' vol. xx, p. 387, and at p. 300 of the same volume, in Dr. Galabin's paper on "Cardiographic Tracings."

May 6th, 1874, with dropsy, enlarged liver, albuminuria, and the physical signs of mitral disease. Under treatment he improved, was discharged June 22nd, but was readmitted with relapse of all the symptoms on August 10th. For ten days he took digitalis, at first alone, later with squill and calomel, but the urine was little affected.

On August 20th *Mistura Copaibæ Resinæ*, with a drachm of infusion of digitalis, was ordered, and given until September 28th. The albuminuria diminished, œdema disappeared, and on October 5th he was out of bed. During the next two months he suffered a good deal from bronchitis.

On November 23rd he again was ordered infusion of digitalis, and on the 26th it was given with the copaiba resin as before; this, with a pill of digitalis, squill, and calomel, was continued until December 28th. During this time the dropsy, which had been increasing, again subsided. *Mistura Copaibæ Resinæ* was taken a third time from January 11th to February 18th, ten minims of tincture of digitalis being added between January 21st and February 9th; a fourth time from March 5th to April 3rd, also with tincture of digitalis, five minims; and a fifth time from July 29th to August 31st, with five minims of tincture of digitalis for the last ten days.

Aug. 12	12 oz.	Sept. 1	96 oz.	Sept. 21	62 oz.
" 13	20 "	" 2	84 "	" 22	59 "
" 14	20 "	" 3	78 "	" 23	73 "
" 15	22 "	" 4	64 "	" 24	62 "
" 16	23 "	" 5	64 "	" 25	62 "
" 17	26 "	" 6	62 "	" 26	58 "
" 18	30 "	" 7	57 "	" 27	52 "
" 19	30 "	" 8	54 "	" 28	54 "
" 20	22 "	" 9	64 "	" 29	50 "
" 21	31 "	" 10	58 "	" 30	48 "
" 22	42 "	" 11	50 "	Oct. 1	43 "
" 23	50 "	" 12	54 "	" 2	40 "
" 24	64 "	" 13	60 "	" 3	37 "
" 25	88 "	" 14	56 "	" 4	42 "
" 26	94 "	" 15	48 "	" 5	38 "
" 27	100 "	" 16	60 "	" 6	39 "
" 28	104 "	" 17	74 "	" 7	36 "
" 29	126 "	" 18	66 "	" 8	36 "
" 30	110 "	" 19	60 "	" 9	40 "
" 31	116 "	" 20	80 "	" 10	43 "

October 11	42 ounces.		Dec. 31	30 ounces, sp. gr. 1020.	
" 12	44 "		January 1	28 "	
" 13	45 "		" 2	39 "	
" 14	35 "		" 3	36 "	
" 15	38 "		" 4	38 "	
" 16	34 "		" 5	34 "	
" 17	19 "		" 6	34 "	
" 18	18 "		" 7	31 "	" 1014.
" 19	16 "		" 8	37 "	
" 20	18 "		" 9	35 "	
" 21	23 "		" 10	33 "	
" 22	34 "		" 11	37 "	" 1020.
" 23	30 "		" 12	30 "	" 1020.
" 24	26 "		" 13	37 "	" 1016.
" 25	24 "		" 14	59 "	" 1010.
" 26	26 "		" 15	63 "	
" 27	29 "		" 16	58 "	
" 28	28 "		" 17	54 "	
" 29	30 "		" 18	40 "	
" 30	27 "		" 19	48 "	
" 31	36 "		" 20	44 "	
December 4	45 "		" 21	45 "	
" 5	50 "	sp. gr. 1015.	" 22	50 "	
" 6	65 "		" 23	52 "	
" 7	65 "		" 24	51 "	
" 8	75 "		" 25	48 "	
" 9	89 "		" 26	47 "	
" 10	85 "		" 27	50 "	
" 11	116 "		" 28	66 "	
" 12	110 "		" 29	61 "	
" 13	118 "		" 30	59 "	
" 14	80 "	" 1012.	" 31	60 "	
" 15	104 "		February 1	51 "	
" 16	85 "		" 2	44 "	
" 17	74 "		" 3	50 "	
" 18	66 "		" 4	54 "	
" 19	59 "	" 1012.	" 5	58 "	
" 20	61 "		" 6	56 "	
" 21	58 "	" 1014.	" 7	57 "	
" 22	50 "	" 1018.	" 8	50 "	
" 23	48 "	" 1020.	" 9	47 "	
" 24	44 "	" 1020.	" 10	48 "	
" 25	45 "		" 11	54 "	
" 26	41 "		" 12	48 "	
" 27	38 "		" 13	50 "	
" 28	36 "	" 1020.	" 14	56 "	
" 29	31 "	" 1020.	" 15	60 "	
" 30	29 "		" 16	48 "	

Feb. 17	50 ounces.	April 6	58 ounces.		
" 18	21 "	" 7	43 "		
" 19	40 "	" 8	37 "		
" 20	42 "	" 9	35 "		
" 21	39 "	" 12	36 "		
" 22	36 "	" 20	28 "		
" 23	30 "	" 28	39 "		
" 24	34 "	" 29	48 "		
" 25	32 "	" 30	43 "		
" 26	29 "	May 3	46 "		
" 27	30 "	" 4	45 "		
" 28	28 "	" 5	48 "		
March 1	31 "	" 6	46 "		
" 2	28 "	" 7	42 "		
" 3	26 "	" 8	47 "		
" 4	20 "	" 9	40 "		
" 5	26 "	" 10	45 "		
" 6	34 "	" 11	61 "		
" 7	55 "	" 12	58 "		
" 8	56 "	" 13	59 "		
" 9	54 "	" 14	50 "		
" 10	} 107 "	" 15	48 "		
" 11		July 31	67 "	2 motions.	
" 12	64 "	August 1	75 "	4 "	
" 13	62 "	" 2	62 "	2 "	
" 14	} 153 "	" 3	72 "	3 "	
" 15		" 4	59 "	2 "	
" 16	69 "	" 5	65 "	2 "	
" 17	59 "	" 6	57 "	1 "	
" 18	62 "	" 7	65 "	2 "	
" 19	67 "	" 8	45 "	1 "	
" 20	63 "	" 9	35 "	2 "	
" 21	66 "	" 10	43 "	2 "	
" 22	60 "	" 11	54 "	3 "	
" 23	56 "	" 12	47 "	2 "	
" 24	} 131 "	" 13	51 "	1 "	
" 25		" 14	55 "	1 "	
" 26	62 "	" 15	43 "	1 "	
" 27	81 "	" 16	30 "	2 "	
" 28	41 "	" 17	32 "	3 "	
" 29	37 "	" 18	24 "	5 "	
" 30	} 86 "	" 19	37 "	1 "	
" 31		" 20	20 "	2 "	
April 1	43 "	" 21	25 "	0 "	
" 2	38 "	" 22	20 "	0 "	
" 3	} 82 "	" 23	} 75 "	{ 0 "	
" 4		" 24			
" 5	59 "	" 25	44 "	5 "	

August 26	73 ounces.	3 motions.	Sept. 29	49 ounces.	2 motions.
" 27	59 "	1 "	" 30	44 "	2 "
" 28	48 "	2 "	October 1	30 "	5 "
" 29	42 "	2 "	" 2	36 "	2 "
" 30	51 "	1 "	" 3	35 "	1 "
" 31	48 "	2 "	" 4	39 "	2 "
September 1	122	{ 2	" 5	52 "	2 "
" 2		{ 2	" 6	64 "	2 "
" 3	72 "	1 "	" 7	40 "	2 "
" 4	69 "	2 "	" 8	8 "	0 "
" 5	61 "	2 "	" 9	20 "	0 "
" 6	61 "	2 "	" 10	38 "	2 "
" 7	58 "	1 "	" 11	44 "	2 "
" 8	44 "	2 "	" 12	38 "	1 "
" 9	—	2 "	" 13	42 "	2 "
" 15	40 "	3 "	" 14	38 "	2 "
" 16	43 "	2 "	" 15	34 "	2 "
" 17	46 "	3 "	" 18	36 "	1 "
" 18	38 "	4 "	" 19	37 "	3 "
" 19	43 "	4 "	" 20	33 "	6 "
" 20	38 "	2 "	" 21	35 "	8 "
" 21	52 "	3 "	" 22	11 "	0 "
" 22	41 "	3 "	" 23	16 "	2 "
" 23	45 "	3 "	" 24	14 "	1 "
" 24	61 "	4 "	" 25	18 "	2 "
" 25	56 "	4 "	" 26	20 "	2 "
" 26	59 "	3 "	" 27	17 "	3 "
" 27	51 "	2 "	" 28	18 "	2 "
" 28	48 "	3 "			

CASE 18.¹—*Constricted mitral; enlarged pulsating liver.*

Henry H—, æt. 24, was admitted under Dr. Moxon's care, February 10th, 1875, with the symptoms and physical signs of stenosis of the mitral orifice, dyspnœa, congestion of the cheeks and lips, enlarged heart, systolic apex murmur, with reduplication of the second sound, and short diastolic murmur. The liver was enlarged, distinctly pulsating, and causing considerable distress from its engorgement.

On March 9th he was ordered to take *Mistura Copaibæ Resinæ*, but this was discontinued on the 18th on account of the appearance of a pink papular rash. During its administra-

¹ The case of this patient is alluded to in volume xx of these Reports, pp. 295 and 298.

tion the fulness of the liver subsided, but increased after the 18th, until it was again reduced by the influence of the resin on the 26th and subsequent days.

The urine measured on—

March 11	110 oz.	March 20	60 oz.	March 27	44 oz.
" 12	120 "	" 21	66 "	" 28	80 "
" 14	110 "	" 22	40 "	" 29	100 "
" 15	108 "	" 23	40 "	" 30	100 "
" 17	104 "	" 24	38 "	" 31	110 "
" 18	110 "	" 25	30 "	April 1	120 "
" 19	64 "	" 26	26 "	" 2	112 "

CASE 19.—*Aortic disease ; dropsy.*

Daniel L—, æt. 33, was admitted under Dr. Moxon, May 22nd, 1874. He had suffered from œdema of the legs and palpitation, and came in with anasarca, ascites, enlarged heart, with diffused, regular, heaving impulse, double aortic bruit, and splashing pulse. The urine was scanty, high-coloured, of sp. gr. 1020, and contained a mere trace of albumen. He took Mist. Copaibæ Resinæ with the following result :

May 25 (P)	14 ounces.	June 8	114 ounces.
" 26	80 " of sp. gr. 1017.	" 4	80 "
" 27	28 " " 1017.	" 5	60 "
" 28	64 " " 1015.	" 6	56 "
" 29	60 " " 1015.	" 7	60 "
" 30	68 " " 1014.	" 8	56 "
June 1	72 "	" 9	40 "
" 2	80 "	" 10	40 "

During this time the bowels were much confined, and he took on May 25th Pil. Coloc. c. Calomel. gr. x, on May 27th the same, and on June 1st he was ordered Pulv. Scammonii Co. gr. viij, alt. mane. His urine still contained albumen, having a sp. gr. of 1014 on June 12th, and of 1030 on June 13th. He left unrelieved on June 15th.

CASE 20.—*Aortic regurgitation ; atheroma and disease of the valves.*

Joseph F—, æt. 59, was admitted under Dr. Habershon, July 1st, 1874, with orthopnœa, œdema of the legs, systolic

and diastolic præcordial murmurs, feeble impulse of heart, and irregular, occasionally splashing pulse. The urine was normal in colour and free from albumen. He had had rheumatism many years previously, and had suffered about six months from fluttering at the heart, pain over the sternum, dyspnœa, and cough.

On July 9th he was ordered Mist. Copaibæ Resinæ, and on the 11th it is remarked that "patient passes about 60 ounces daily, the swelling of the legs is slowly subsiding."

July 10	.	60 ounces.	|	July 12	.	60 ounces.
" 11	.	58 "	|	" 13	.	57 "

On the 18th he spat some blood.

On the 21st he was ordered Mist. Senegæ ʒj t. d., and on the 25th digitalis and iron in small doses.

The copaiba was resumed on August 3rd, but no note was taken of the urine, and on August 10th he died.

Atheromatous degeneration of the aorta, thickening of the valves with eversion of one of them, dilatation of the heart without hypertrophy, were the chief changes noticeable at the post-mortem examination.

CASE 21.—*Ascites; albuminuria; enlarged heart and systolic apex murmur.*

Susannah S—, æt. 52, was admitted under Dr. Fagge, May 11th, 1874, suffering from a considerable degree of ascites; the abdomen measured forty-three and a half inches; the impulse of the heart was below and to the left of the nipple, and a systolic murmur was audible at the apex but not in the back. She was married, had had rheumatic fever, and for the last seven months had suffered from dropsy of the abdomen.

She was ordered Mist. Copaibæ Resinæ ʒj t. d., and passed on May 12th urine of sp. gr. 1027, high-coloured, moderately albuminous, with hyaline casts.

May 13	10 ounces.	|	May 15	.	.	.	10 ounces.
" 14	14 "	|					
	sp. gr. 1025	|					

The copaiba was discontinued, and paracentesis abdominis was performed on the 14th; the urine subsequently varied from 14 to 20 ounces, was albuminous and contained casts. After digitalis and purgatives for a few days the pulse became steadier, and the urine measured 19 ounces, but the abdominal fluid was accumulating.

May 24	26 ounces.		May 28	39 ounces.	sp. gr. 1012
" 25	29 "	sp. gr. 1017	" 29	44 "	
" 26	45 "	" 1014	" 30	42 "	
" 27	30 "	" 1016	June 1	14 "	" 1024

On this day the copaiba resin was again ordered.

June 2	38 ounces,	sp. gr. 1015	June 6	52 ounces.	
" 3	50 "	" 1010	" 7	40 "	
" 4	48 "	" 1010	" 8	27 "	
" 5	54 "				

The abdomen now measured thirty-nine and a half inches; there was no dyspnœa; the heart's action was heaving. She was ordered Spiritus Armoraciæ ʒj t. d., and subsequently digitalis, squill, and calomel.

On the 15th she took in addition two drachms of cream of tartar in barley-water daily.

She passed—

June 9	17 ounces.		June 17	14 ounces.	sp. gr. 1026
" 10	16 "	sp. gr. 1026	" 18	16 "	" 1028
" 11	18 "		" 19	10 "	" 1026
" 12	14 "		" 20	20 "	" 1022
" 13	10 "	" 1028	" 21	26 "	
" 15	18 "	" 1026	" 22	8 "	" 1026
" 16	14 "	" 1026			

After this date the specific gravity fell, but the measurements were not properly made, as much urine was lost with the motions.

On July 9th the resin of copaiba was again given, and the patient said she noticed an effect on her urine.

She left on July 24th.

CASE 22.—*Mitral regurgitation ; dropsy.*

Robert T—, æt. 28, was admitted under Dr. Moxon, September 23rd, 1874, with anasarca of the feet, legs, thighs, and

back; with hacking cough, hurried respiration, and orthopnoea. The cardiac dulness was increased in extent, the apex beat in the sixth space external to the nipple, and a systolic bruit was heard at the apex and behind. The urine was high-coloured, of sp. gr. 1020, albuminous. He had had rheumatic fever twice, being almost confined to the house since the last attack nine months ago.

He took the following mixture from September 26th until within a few days of his death:

℞ Infus. Digitalis, ʒj;
 ℞ Mist. Copaibæ Resinæ, ʒj, t. d.

September	24	...	20 ounces	...	Sp. gr. 1020	...	Albuminous.
"	25	...	20	"	...	" 1018	"
"	26	...	20	"	...	—	"
"	27	...	20	"	...	—	"
"	28	...	21	"	...	—	"
"	29	...	19	"	...	" 1020	" (½).
"	30	...	29	"	...	" 1015	" (⅓).
October	1	...	40	"	...	" 1014	" (¼).
"	2	...	39	"	...	" 1010	A trace of albumen.
"	3	...	40	"	...	" 1010	Albuminous.
"	4	...	41	"	...	" 1015	" (⅓).
"	5	...	40	"	...	" 1012	A trace of albumen.
"	6	...	60	"	...	" 1010	" "
"	7	...	78	"	...	" 1012	No albumen.
"	8	...	64	"	...	" 1010	"
"	9	...	60	"	...	" 1010	A trace of albumen.
"	10	...	68	"	...	" —	—
"	11	...	58	"	...	" —	—
"	12	...	50	"	...	" 1010	No albumen.

On September 30th the heart's action was observed to be quieter.

On October 5th and 8th the sputa were sanguineous; the cough became constant and troublesome, dropsy and dyspnoea increased, and he died on the 15th.

Post-mortem.—Heart 17 ounces; left ventricle thin and dilated, right cavities rigid and hypertrophied, chordæ tendinæ thickened, mitral orifice admitting three fingers. Pericardium adherent. Liver nutmegged. Kidneys large, indurated, glistening.

CASE 23.—Mitral constriction; dropsy.

Amelia C—, æt. 33, was admitted under the care of Dr. F. Taylor, August 26th, 1874. She had had hæmoptysis, dyspnœa, and œdema of the feet four years previously, and was in the hospital with mitral stenosis and left pleural effusion in the spring of 1873. On the present occasion she had anasarca, ascites, characteristic presystolic murmur, scanty, high-coloured urine of sp. gr. 1020, free from albumen; pulse 88, irregular; resp. 34; temp. 98·6°.

Tincture of digitalis and spirit of nitrous ether were given until September 2nd, when copaiba resin was ordered with a grain of digitalis powder three times a day. After three days only half the dose of copaiba was given, and the digitalis was omitted. All medicine was stopped on September 12th, but the copaiba resin was again given in half-ounce doses from September 14th until September 22nd. Subsequently she took digitalis, acetate of potash, and spirits of nitrous ether in varying doses, and slowly improved.

She passed on—

Aug. 27	4 oz.	Sept. 8	23 oz.	Sept. 20	28 oz.
" 28	4 "	" 9	30 "	" 21	24 "
" 29	5 "	" 10	30 "	" 22	34 "
" 30	4 "	" 11	42 "	" 25	40 "
" 31	18 "	" 12	50 "	" 26	34 "
Sept. 1	19 "	" 13	20 "	" 27	30 "
" 2	10 "	" 14	18 "	" 28	28 "
" 3	12 "	" 15	30 "	" 29	20 "
" 4	28 "	" 16	24 "	Oct. 3	40 "
" 5	33 "	" 17	60 "	" 4	60 "
" 6	34 "	" 18	48 "	" 5	58 "
" 7	30 "	" 19	40 "		

CASE 24.—Morbus cordis; dropsy.

Arthur S—, æt. 27, was admitted under Dr. Pavy, February 6th, 1875, with œdema of the feet, palpitation of the heart, occasional systolic apex murmur, and albuminous urine. He had never had rheumatic fever, and his symptoms had only been noticed three weeks. Digitalis, successively, as tincture,

powder, and infusion, was given with little result, and on February 23rd the copaiba was ordered.

He passed on—

Feb. 10	16 oz.	Feb. 21	20 oz.
" 12	16 "	" 22	18 "
" 13	20 "	" 23	24 "
" 14	10 "	" 24	20 "
" 15	10 "	" 25	22 "
" 16	23 "	" 26	24 "
" 17	8 "	" 27	— much purged.
" 18	7 "	" 28	— " "
" 19	20 "	Mar. 1	20 "
" 20	16 "	" 3	— death.

Post-mortem.—Heart 23 ounces; left ventricle dilated and hypertrophied; mitral valve thickened. Kidneys hard.

CASE 25.¹—Mitral regurgitation; dropsy; fibroid heart and adherent pericardium; tubal nephritis; death.

Joseph C—, æt. 42, was admitted under Dr. F. Taylor, March 4th, 1874, with orthopnoea, anasarca, enlarged liver, mitral regurgitant murmur, quick, irregular pulse, and scanty, highly albuminous urine. He had had rheumatic fever nineteen years previously, and the cardiac symptoms had existed three months. Digitalis, with tincture of squill, acetate of ammonia, and compound jalap powder was given, and for a short time he improved.

On March 16th his urine measured 43 ounces. The resin of copaiba was given in the usual dose from March 19th to April 2nd.

He died with increasing dropsy and inefficiency of the heart on April 8th.

He passed on—

Mar. 16	43 oz.	Mar. 24	8 oz.	April 3	8 oz.
" 19	38 "	" 25	8 "	" 4	10 "
" 21	10 "	April 1	26 "	" 5	12 "
" 23	10 "	" 2	28 "	" 6	18 "

¹ This case forms one of a series of cases of fibroid disease of the heart, shown at the Pathological Society by Dr. Hilton Fagge, and reported by him in the 25th volume of the 'Transactions.'

Post-mortem.—Heart 34 ounces ; left ventricle dilated, partly fibroid ; pericardium adherent. Lungs showing brown induration and pulmonary apoplexy. Kidneys very uneven on the surface, mottled, and evidently affected with advanced (fatty) epithelial nephritis, besides being indurated as the result of the heart disease.

CASE 26.—*Dilated heart, with adherent pericardium ; granular kidneys ; death.*

Alfred M—, æt. 41, was admitted under Dr. Moxon's care, April 25th, 1875, with dropsy, enlarged heart and liver, small, quick, and feeble pulse, and albuminous urine. He had suffered from dyspnœa and palpitation of the heart for about two years, and had had an attack of right hemiplegia, with anæsthesia and slight aphasia, six days before admission.

On May 4th he was drycupped between the shoulders.

On the 11th was ordered digitalis in doses of seven minims of the tincture three times daily, and on the 18th *Mistura Copaibæ Resinæ* was given.

He passed on—

May 12	24 oz.		May 17	24 oz.	
" 18	52 "		" 18	24 "	sp. gr. 1021
" 14	20 "	sp. gr. 1024	" 19	22 "	
" 15	24 "	" 1020	" 20	22 "	" 1022
" 16	20 "	" 1021	" 21	26 "	" 1020

Death took place the following day.

Post-mortem.—Heart 23 ounces ; right side preponderating, left ventricle dilated, muscular fibre fatty. Pericardium adherent. Kidneys 11½ ounces, the surface granular, and cortex much wasted.

CASE 27.—*Cardiac dropsy ; dilated heart and granular kidneys.*

Margaret W—, æt. 74, was admitted under Dr. Pye-Smith's care, August 7th, 1874.

One month before admission she had noticed that her feet

were swollen, and the œdema subsequently affected the legs and abdomen. The urine became scanty and she was troubled with dyspnœa. She came in with dyspnœa, œdema of the feet, ascites, and increased hepatic dulness. The præcordial dulness was increased, the impulse diffused, and a faint systolic murmur was audible at the apex; the pulse was irregular and feeble. She was ordered digitalis, but passed only 8 ounces of urine on the 13th, 6 ounces on the 14th, and 4 ounces on the 15th. In the beginning of September she was passing large amounts of urine, "two quarts daily," and the dropsy had disappeared. On the 8th September she was ordered digitalis and squill, a grain each in pill night and morning, and during the month she improved so as to be able to go out. On October 5th the urine was again scanty, the pulse irregular, and the digitalis was increased, that is, she took a drachm of infusion three times a day and one grain in pill at night. The urine at this period was very scanty, thus:

Oct. 7, about 2 ounces.	Oct. 14, about 8 ounces.
" 8, " 2 "	" 15, very scanty, with difficulty
" 9, " more urine."	saved.
" 12, about 20 ounces.	

On this day *Mistura Copaibæ Resinæ* was ordered.

Oct. 16, scanty, 4 ounces collected.
" 17, " 1 ounce saved.
" 20, very scanty.

From the 14th October until her death on the 23rd the urine contained albumen.

Post-mortem.—Lungs: right side, hydrothorax, with compression of lung and hæmorrhagic infarction; left side, hæmorrhagic infarction. Heart 15 ounces, both ventricles dilated, mitral orifice dilated. Muscular tissues flabby and in a state of brown atrophy. Liver congested and fatty with thickened capsule. Spleen 6 ounces, firm. Kidneys 12 ounces, surfaces decidedly granular; tissue firm, with opaque yellow mottling.

CASE 28.—Mitral constriction; granular and fatty kidneys.

Mary Ann T—, æt. 40, came in under Dr. Pavy's care, January 6th, 1875. She had had rheumatic fever six years previously, and had suffered pain in the chest and dyspnœa about two years; for two months she had had cough. On admission there were œdema of the legs, albuminuria, musical systolic murmur at apex. She took digitalis and other diuretics until February 18th, when she was ordered the copaiba resin mixture with ten minims of tincture of digitalis.

She passed on—

Feb. 16	22 oz.		Feb. 23	14 oz.	
" 18	40 "		" 26	12 "	gin 1 oz.
" 19	40 "		" 27	12 "	
" 20	20 "		" 28	11 "	
" 22	—	"a small quantity."	Mar. 1	20 "	
			" 4	—	death.

Post-mortem.—Heart 15 ounces, mitral valve narrowed so that it would barely admit the little finger. Liver nutmeggy. Kidneys 8 ounces, surface very granular, capsule adherent, cortex wasted with many points of fatty inflammatory degeneration.

DROPSY, SECONDARY TO BRONCHITIS AND EMPHYSEMA.

Little need be said of the two cases placed under this heading. In the first the diuresis was at times remarkable, but not very uniform. In the second the effect was much less striking, but, considering the relaxed state of the bowels at the time and the very low specific gravity of the water saved, it is probable that an increase in the flow of urine took place, and that the figures recorded do not fairly represent the amounts actually passed.

CASE 29.—Chronic bronchitis; dropsy.

George C—, æt. 33, was admitted under Dr. Pavy, and was subsequently under Dr. Moxon and Dr. Pye-Smith. He had

his first severe attack of bronchitis five years ago and it had returned every winter, being accompanied on the third occasion with swelling of the legs. On admission, January 1st, 1874, after three months' illness, he had orthopnoea, much cyanosis, and dropsy of the legs, with the physical signs of emphysema and bronchitis. On February 13th his urine contained albumen, and during the rest of the month the dropsy increased. He was treated with expectorants and purgatives until March 12th, when he was reported to be passing "on an average about one pint daily," and was ordered *Mistura Copaibæ Resinæ* ℥j t. d.

March 14th.—"The quantity of water has not increased much; he now passes a pint and a half."

Elatarium and scammony powders were given during the following ten days, and the dropsy was observed to have left his arm on March 19th, and the report continues as follows :

March 30	...	40 ounces	...	The legs are smaller and softer.
April 8	...	160 "	...	—
" 9	...	278 "	...	The copaiba resin discontinued.
" 10	...	74 "	...	—
" 11	...	—	...	Copaiba again ordered twice a day.
" 12	...	220 "	...	—
" 13	...	50 "	...	—
" 14	...	70 "	...	—
" 15	...	—	...	Copaiba to be given once a day.
" 16	...	40 "	...	—
" 17	...	50 "	...	Severe diarrhoea; medicine to be discontinued.

During the free diuresis the swelling of the legs subsided rapidly, and on April 22nd the patient was about the ward and even out in the grounds. Subsequently his symptoms returned; the *Mistura Copaibæ Resinæ* was ordered on April 18th with the result of increasing the urine to 80 ounces on the 2nd May.

CASE 30.—*Emphysema; bronchitis; dropsy; albuminuria.*

Mary M'G—, æt. 29, was admitted under Dr. Fagge, April 15th, 1874, with anasarca of the legs, cough, dyspnoea, lividity

of the face; there were also the physical signs of emphysema and bronchitis, a systolic cardiac murmur, inaudible behind, and pale albuminous urine of sp. gr. 1014. She had become subject to cough five years before; swelling of the feet, legs, and loins had come on quickly three weeks previously. Digitalis, senega, and acetate of ammonia were first given, and she passed urine of sp. gr. 1020—1025 as follows:

April 16	14 oz.	April 18	18 oz.	April 20	10 oz.
" 17	6½ "	" 19	16 "		

On the 23rd April she was ordered syrup of ginger in copaiba resin mixture, and passed—

April 23	44 ounces.	April 28	52 ounces.	Sp. gr. 1006.
" 24	24 " Sp. gr. 1011.	" 29	20 " "	1008.
" 25	10 " Some was lost	May 1	8 " "	
	with the mo-	" 2	10 " "	1014.
	tions.	" 3	34 " "	
" 27	30 " Sp. gr. 1010.	" 4	24 " "	1013.

During the first half of this period the bowels were relaxed, and it appears that much urine was lost with them.

On the 25th the digitalis mixture was given at the same time as the copaiba mixture, and on May 2nd tincture of larch bark was added to the latter in doses of thirty minims.

The patient continued to get worse, and she was tapped on May 4th, 9 pints 12 ounces being withdrawn. At 10 p.m. on May 6th she died.

Post-mortem.—Lungs emphysematous with œdema of the lower lobes. Heart, right ventricle thickened and fatty. Liver 70½ ounces, fatty, and partly nutmegged. Kidneys 14½ ounces, the surface smooth. Peritoneum recently inflamed.

PLEURITIC EFFUSION.

In all of these cases the resin of copaiba had some influence on the secretion of urine; in two it was decided; the daily quantity of urine rising in Case 81 to 60, 70, and 80 ounces, and in Case 32 even to 100 ounces. In Case 38 the observation is less striking on account of the frequent loss of urine with the motions; and in Case 34 the effect, at first sufficiently marked,

was not sustained for more than a short time. With regard to the progress of the disease under the use of the drug it will be seen that in two cases (Nos. 31 and 33) the effusion subsided as the quantity of urine became larger; but in the two remaining cases no effect was produced, one recovering only after the discontinuance of the resin, the other requiring the operation of paracentesis.

CASE 31.—Pleuritic effusion.

John C—, æt. 32, was admitted under Dr. Moxon, April 13th, 1874, with the physical signs of effusion into the left chest; dulness reached as high as the sixth dorsal vertebra; the heart was displaced to the right, the spleen downwards, and the chest on that side measured one inch more than on the other. He had had cough, expectoration, loss of flesh, and night sweats, since October, but the present illness had begun distinctly on April 1st. During the first week he was ordered cod-liver oil and quinine with little result, and on the 25th took his first dose of copaiba resin.

He passed on—

April 21	34 ounces.	April 27	76 ounces, sp. gr. 1012.
" 22	26 "	" 28	88 " " 1011.
" 23	28 " sp. gr. 1024.	" 29	62 " " 1014.
" 24	25 " " 1026.	" 30	85 " " 1012.
" 25	38 " " 1024.	May 2	88 " " 1020.
" 26	66 " " 1024.		

With the increase in the quantity of the urine the pleuritic effusion subsided. He was again ordered cod-liver oil and quinine on April 30th, and, continuing to improve, left the hospital on May 21st.

CASE 32.—Pleuritic effusion.

Francis F—, æt. 48, was admitted under Dr. Pye-Smith, August 14th, 1874, with the physical signs of pleural effusion on the left side, dulness rising to the fourth rib in front and to the spine of the scapula behind; the heart's impulse was to the right of the sternum; the urine had a sp. gr. of 1015 and

was not albuminous. He had been ill six weeks with cough, dyspnœa, and frothy expectoration.

On August 15th he was ordered *Mist. Copaibæ Resinæ* ℥j t. d., and he passed on—

Aug. 17	44 oz.	Aug. 22	65 oz.	Aug. 26	104 oz.
" 18	80 "	" 23	60 "	" 27	80 "
" 19	70 "	" 24	48 "	" 28	71 "
" 20	54 "	" 25	60 "	" 29	46 "
" 21	48 "				

On this date he was jaundiced, the physical signs having altered very little; the copaiba was omitted, and *Mistura Magnes. Carb. c. Magnes. Sulph.* substituted. The jaundice gradually subsided, and on September 5th the copaiba was again ordered. Between August 29th and September 5th, during the suspension of the resin, he passed about two pints daily; between September 5th and September 10th the quantity rose to about five pints daily. At this date jaundice was still present, and he became more and more nauseated by the medicine, so that it was discontinued on September 13th. It was not till after this that the area of dulness steadily diminished in extent, and he was discharged much improved on September 28th.¹

CASE 83.—*Pleuritic effusion.*

Margaret L—, æt. 16, was admitted under the care of Dr F. Taylor, July 13th, 1874. She gave a history of symptoms referable to acute pleurisy beginning two weeks before admission, and presented the physical signs of left pleuritic effusion, the side being universally dull, the heart and spleen displaced. The urine contained no albumen, and had a sp. gr. of 1020. Temp. 101° F., pulse 120, resp. 40. Ordered *Mist. Salinæ* ℥j t. d.

July 15, ordered *Mist. Copaibæ Resinæ* ℥j, t. d. s.
 " 16, passed 28 ounces.
 " 17, " 34 "
 " 18, " an increased quantity, but it was not saved.

¹ He was admitted into the hospital again in May, 1875, and died in July with malignant growth of the peritoneum. Both pleuræ were thickened by old adhesions, and the lungs were tuberculous. The kidneys were healthy.

July 19, passed 20 ounces; some more was passed with the motions.

" 20, " 20 " " " "

" 21, " 34 " saved.

" 23, " 44 "

" 24, " 40 " some more escaped with the motions.

" 26, " 62 "

" 27, " 64 "

On the 18th the chest showed the first signs of diminution of the fluid; the infra-clavicular dulness gave place to a high-pitched percussion note; the heart moved slightly towards the left, and the patient found she could lie on the right side without distress.

On the 19th resonance extended downwards to the third rib.

On the 20th a pleuritic rub was heard over the cardiac area.

On the 21st the spleen could not be felt below the margin of the ribs, and on the 22nd other friction sounds were audible posteriorly.

On the 24th the only part of the left chest still remaining dull was the left base below the angle of the scapula.

On the 26th the rubs were inaudible, and on August 5th she was discharged well.

CASE 34.—*Pleuritic effusion.*

Edward R—, æt. 43, was admitted under the care of Dr. Wilks, August 12th, 1874, with the signs of right pleural effusion. Dulness commenced at the second rib, extended over the middle line of the sternum, while the præcordial and the hepatic dulness were displaced outwards and downwards respectively. He had had severe pain in the right side with dry cough five months previously, and these, subsiding, were followed by dyspnoea, debility, and loss of flesh. He was ordered copaiba resin mixture, and passed on—

Aug. 14	20 oz.	Aug. 17	40 oz.	Aug. 20	28 oz.
" 15	64 "	" 18	44 "	" 21	30 "
" 16	56 "	" 19	50 "		

On August 20th a blister was applied to the right side of the chest.

On the 24th iodide of potassium was given, but as the physical signs did not improve paracentesis thoracis was performed on September 1st, and 16½ ounces of clear straw-coloured fluid withdrawn. The patient left well on the 30th.

RENAL DROPSY.

Considerable interest attaches to the cases forming this group in connection with the local action of the resin of copaiba; and the questions at once arise—firstly, whether it causes diuresis when the kidneys are diseased; secondly, whether under the same circumstances it does any appreciable harm to the patient. In attempting to answer the first of these questions the variety of the Bright's disease must be taken into consideration, since the amount of urine usually secreted is different in different kinds, and even in different stages of the same kind of this complaint. The urine is not invariably scanty; it is abundant in stages of recovery of acute tubular nephritis, in the middle periods of the granular kidney, and in well-marked cases of lardaceous disease. Even in the later stages of the chronic fatty degeneration resulting from tubular nephritis I have seen a temporary improvement, marked by rapid subsidence of the dropsy, with a sudden increase of the quantity of the urine to three or four pints daily. But it is true, generally, that where dropsy is present the urine is scanty, and it is therefore chiefly in the varieties or stages characterised by these two conditions that a diuretic action would be desirable. The six cases here recorded include four varieties of disease, and therefore, though each case is more or less valuable in itself, there are too few of each kind to supply trustworthy evidence on the subject under consideration. The condition best represented is acute tubular nephritis, of which there are three cases (Nos. 36, 37, and 38); and there is one case of each of the following varieties of Bright's disease: chronic granular kidney (No. 35), mixed granular and fatty kidneys (No. 39), and lardaceous disease (No. 40).

The result of the first three cases above mentioned, all apparently unmixt cases of tubular nephritis, seem to point to the conclusion that in this affection, whether its early acute form

or its later stage of fatty degeneration, the administration of the resin of copaiba does not appreciably increase the quantity of urine. But it will be remembered that in the remarks on the cardiac cases it was suggested that the failure of the drug to produce diuresis in the last four cases (Nos. 25—28) might be in part attributable to this condition of the kidneys; and a reference to the post-mortem results, or to the summary given on page 26, will show that three out of the four presented mixed conditions of interstitial inflammation with fatty degeneration. With these last, so far as the kidneys are concerned, Case 39 may also be considered, making a total of eight cases in which the drug had no marked effect. Of these, four are cases of primary renal disease and four of renal disease accompanied by some affection of the heart.

There remain two cases upon which the resin does not seem to have been without influence; in neither, however, was the urine at the time scanty. In Case 35 the urine before admission is described as having been abundant, and it was found by measurement, prior to the use of the medicine, to be 68 and 72 ounces in the twenty-four hours; albuminuria was present, and the kidneys were presumed to be granular, though he had at the same time stricture of the urethra and was passing some pus in the urine. Under treatment the quantity rose to 80, 90, and 100 ounces. The second of these cases (No. 40) is a typical example of lardaceous disease of the kidneys; the patient was passing a sufficient quantity of pale, highly albuminous urine, which measured 50 ounces on the day before the *Mistura Copaibæ Resinæ* was ordered; it rose then to 80, 90, and 100 ounces, giving an average of 91 for eight consecutive days, from the third to the tenth of the treatment.

The second question is more difficult to answer from the limited number of cases here recorded. There was no evidence that in any of the four cases (Nos. 36—39) positive harm followed the use of the resin. In Case 36 the height of the disease had been already reached, the dropsy was subsiding, the urine becoming more abundant, and the treatment offered no check to this favorable progress. In Cases 38 and 39 the results appeared to be simply negative; but in Case 37 it will be seen that during the employment of copaiba the urine actually became less in quantity, if one compares the average daily excretions at that time with the average daily

flow during any corresponding period afterwards, or during the whole time from the discontinuance of the medicine until death. The mixture was taken for ten days, and the average number of ounces for the six days on which the urine was measured is 35; the next six days give an average of 52; the next six, of 34; the next six, of 44; the next six, of 56; and last seven, of 48. The whole period of thirty-one days during which no copaiba resin was taken yielding a daily average of 47.

CASE 35.—*Chronic nephritis; stricture of urethra; syphilis.*

Richard W—, æt. 35, was admitted under Dr. Moxon, April 29th, 1874, with a history of venereal disease at the age of sixteen, and stricture of the urethra since. In March, 1874, he had cramps in the legs and in the middle of April they were swollen; he had also noticed that his urine was less in quantity, but it increased after taking some medicine. On admission he had œdema of the legs as high as the knees, slight dry cough, abundant albuminous urine, passed frequently during the night and containing many pus-cells and large granular cells. There was a purulent discharge from the urethra, and a double stricture was diagnosed on examination. He took iodide of potassium and quinine, then for a time hæmatoxylum mixture, and on May 21st he was ordered *Mistura Copaibæ Resinæ* ʒj, t. d. He passed on—

May 6	23.ounces,	sp. gr. 1018.	May 24	60 ounces.	
" 7	36	" " 1016.	" 25	60	"
" 8	36	" " 1018.	" 26	78	" sp. gr. 1020.
" 9	38	" " 1018.	" 27	142	" " 1013.
" 10	40	" " 1018.	" 28	104	" " 1015.
" 11	40	" " 1018.	" 29	114	" " 1014.
" 12	38	" " 1020.	" 31	90	"
" 13	50	" " 1015.	June 3	72	"
" 14	56	"	" 5	86	"
" 16	64	"	" 6	90	"
" 17	72	" " 1014.	" 7	96	"
" 19	68	" " 1022.	" 8	94	"
" 22	66	" " 1022.			

The dropsy of the legs continued, headache was frequently present, and he was unable to hold more than 4 or 5 ounces

of water in his bladder. On June 10th he was transferred to a surgical ward.

CASE 36.—*Acute tubal nephritis.*

Mary S—, æt. 37, was admitted into Astley Cooper Ward under Dr. Moxon, April 2nd, 1874, suffering from general anasarca of seven weeks' duration; the urine was highly albuminous. She was ordered Pulv. Jalapæ Co. ℥j every morning, and Mistura Ammonizæ Acetatis ʒj t. d.

On April 3rd the urine measured 30 ounces.

On the 7th the abdomen was already less swollen.

She passed on—

April 11	.	30 ounces.	|	April 13	.	40 ounces.
" 12	.	22 "	|	" 14	.	36 "

On this day she was ordered to take Mist. Copaibæ Resinæ ʒj t. d.

She passed on—

April 16	40 ounces, sp. gr. 1012.	|	April 24	24 ounces.
" 17	60 " " 1012.	|	" 25	40 "
" 18	60 "	|	" 26	40 "
" 19	60 "	|	" 27	56 "
" 20	30 "	|	" 28	40 "
" 22	40 "	|	" 29	40 "
" 23	30 "	|	" 30	46 "

During this time the dropsy gradually diminished, and on the 27th it was observed to have left her entirely. She was discharged well on May 2nd.

CASE 37.—*Tubular nephritis; pericarditis; psoas abscess.*

Benjamin P—, æt. 31, was admitted under Dr. F. Taylor in Dr. Moxon's absence, March 11th, 1874. He was suffering from dyspnœa and general anasarca of two months' duration; his urine was scanty and albuminous; the heart sounds were normal; at the base of the right lung was dulness with deficiency of the breath sounds, and at the base of the left some submucous crepitation was audible. Diaphoretics and purga-

tives were administered, and for four weeks he continued much the same, the urine varying in quantity from 8 to 23 ounces, and in density from 1030 to 1040. About the middle of April he was frequently sick, and he was unable to take *Mist. Resinæ Copaibæ* on account of this. It was, however, again ordered on the 20th, and he took it till the 30th, the daily quantities of urine being as follows :

April 22	—	Sp. gr. 1014.	May 17	40 ounces.	
" 23	110 ounces,	" 1012.	" 18	40 "	
" 24	7 "		" 19	44 "	sp. gr. 1010.
" 25	15 "		" 20	45 "	
" 26	32 "		" 21	46 "	
" 27	27 "	" 1015.	" 22	44 "	
" 30	18 "		" 23	46 "	
May 1	28 "	" 1014.	" 24	54 "	
" 2	32 "		" 25	58 "	
" 4	40 "		" 26	48 "	" 1010.
" 5	74 "		" 27	68 "	
" 6	40 "	" 1012.	" 28	56 "	
" 7	46 "		June 1	52 "	
" 8	—	" 1012.	" 2	50 "	
" 9	52 "		" 3	40 "	
" 10	36 "		" 4	40 "	
" 11	36 "		" 5	50 "	
" 12	38 "		" 6	60 "	
" 15	24 "		" 8	50 "	
" 16	28 "		" 9	50 "	

On April 30th the copaiba resin was discontinued on account of its causing sickness, which was at first relieved by bismuth. But the urine remained highly albuminous, sickness recurred, and he suffered from constant lumbar pain until his death in the middle of June.

Post-mortem.—Lungs œdematous; fluid in right pleural cavity; recent pleurisy on left side. Heart 16 ounces; recent pericarditis. Kidneys weighing 17 ounces; the left larger, pale, of dead yellowish-white colour, the cortex much increased in extent and less striated than naturally: the right also large, with a smooth mottled surface; the section confused and presenting ecchymoses in places; the cortex increased in breadth. There were also hydatid cysts in the liver and spleen, and a psoas abscess on the left side.

CASE 38.—*Tubal nephritis ; dropsy.*

Mark D—, æt. 46, was admitted under Dr. Wilks' care, December 17th, 1873, with general anasarca, bronchitis, and scanty, highly albuminous urine, of light-brown colour, and sp. gr. 1020. He had been quite well until seven weeks previously. He was treated with diaphoretics and purgatives, but the symptoms continued, and the urine varied in quantity from 20 to 38 ounces.

On February 2nd there were signs of pleural effusion on the left side.

On February 12th he was ordered Mist. Copaibæ Resinæ ʒj t. d.

On the 14th the swelling was not diminished, but the cough and breathing were easier.

On the 18th he still passed very little water. He was ordered half an ounce of infusion of digitalis with an equal quantity of water, and in the evening of the following day had a hot-air bath, from which he obtained great relief. During the next week the urine was greater in quantity, but it was not measured.

On March 11th the following was given :

℞ Sp. Ætheris, ʒxxx;
Tinct. Scillæ, ʒxx;
Ex. Infus. Cascarillæ, ʒj, t. d.;

and in a few days afterwards the patient thought it had a diuretic effect. His symptoms, however, did not improve, and with increasing dropsy and dyspnœa he died March 14th, 1874.

Post-mortem.—Kidneys 16 ounces, pale, and mottled; the cortex was two or three times thicker than normal, its section blurred and mottled with opaque yellow. The arterioles were rather thick. Under the microscope the tubes were seen to be filled with epithelium, much of it of fair quality, much, on the other hand, fatty; there was no interstitial cell-proliferation or increase of fibre; much of the intervening stroma of the organ was very fatty, and epithelial cells filled with fat-granules were found in every part. Heart 20 ounces, hypertrophied.

CASE 39.—*Dropsy and albuminuria ; granular and fatty kidneys.*

William L—, æt. 52, was admitted under Dr. Moxon's care, August 5th, 1874, with dropsy, which had first appeared in the legs and scrotum one month previously. The urine was scanty, highly albuminous, of sp. gr. 1015, and contained casts. He was ordered compound jalap powder every other morning, and acetate of ammonia three times a day. During the continuance of this treatment he improved slightly, the dropsy diminishing, but the urine remained scanty, varying from 10 ounces to 28 ounces, and contained larger quantities of albumen.

On August 26th he had a turpentine vapour bath, and this was repeated on the 27th.

On September 2nd he passed 3½ ounces, and on September 3rd 23 ounces, of albuminous urine, with a sp. gr. 1012.

Mist. Copaiabæ Resinæ was given on the 4th.

Sept. 4	23 oz.	Sept. 7	2½ oz.	Sept. 11	20 oz.
„ 5	22 „	„ 10	19 „		

On the 12th the legs were punctured, and on the 14th the resin was omitted and the old treatment substituted. During the rest of the month the urine continued in much the same quantity and had the same average specific gravity (1010—1012). Death took place on October 20th.

Post-mortem. — Heart hypertrophied ; lungs œdematous. Kidneys 13 ounces, granular, and fatty, with thick and slightly atheromatous arteries ; the cortex was not larger than usual. Other abdominal organs normal.

CASE 40.—*Lardaceous disease of kidneys and other viscera.*

Daniel L—, æt. 15, was admitted under Dr. Taylor, February 22nd, 1875. He had been in the hospital in 1869 under the late Mr. Poland for disease of the frontal bone, and a large portion of it was removed. Subsequently plastic operations were performed for relief of the eversion of the eyelid. In September, 1873, he first had œdema of the legs, and about this time he had also

necrosis of the tibia and abscesses about the elbows. He was in the hospital again in the spring of 1874 with dropsy and abundant albuminous urine.

On admission he was anæmic, with enlargement of the liver and spleen, and pale, very albuminous urine of sp. gr. 1008.

On February 25th *Mistura Copaibæ Resinæ* ʒj was ordered

He passed on—

Feb. 24	50 oz.	Sp. gr. 1006	Mar. 3	106 oz.
" 27	80 "		" 4	102 "
" 28	70 "		" 5	104 "
Mar. 1	70 "		" 6	120 "
" 2	80 "			

On March 8th an itching papular rash appeared, and the dose of the medicine was reduced to one half.

On the 15th it was discontinued. The patient died on May 4th.

Post-mortem.—Lungs, epiglottis, and glottis œdematous. Spleen and liver slightly lardaceous. Kidneys white, very lardaceous; the cortex not wasted, the capsule very adherent. Thyroid body, stomach, and intestines lardaceous.

The following table contains a short analysis of each case, including the average daily excretion of urine without the employment of copaiba, with the number of days over which the observation extended; the average daily excretion during the administration of the resin, also with the number of days; and lastly, the maximum quantity discharged under its influence in any one day.

Case.	Age.	Disease.	Average without copaiba.	No. of days.	Average with copaiba.	No. of days.	Maximum daily excretion.
1	49	Cirrhosis of liver	? 20	?	68	21	116
2	58	"	...	...	65	5	96
3	18	"	...	...	81	13	100
4a	50	Perihepatitis; dilated heart	43	9	80	22	96
b	...	"	...	...	30	7	40

Case.	Age.	Disease.	Average without copaiba.	No. of days.	Average with copaiba.	No. of days.	Maximum daily excretion.
5	41	Cirrhosis of liver	18	1	66	26	78
6	38	"	65	2	126	5	148
7	51	"	? 30	?	? 80	?	...
8	63	"	? 100	?	85	5	110
9	6 $\frac{1}{2}$	"	...	...	31	9	36
10 ^a	45	"	24	3	30	14	46
^b	...	"	49	12	39	18	64
11	46	"	...	...	29	8 ¹	40
12	54	"	27	14	15	8	22
13	40	Cirrhosis and peri- hepatitis	...	...	27	7	48
14	10	Peritoneal effusion	38	3	40	13	76
15 ^a	36	Aortic	...	...	96	17	140
^b	...	"	71	11 ²	95	97	139
16	39	"	34	9	74	34	123
17	20	Mitral	33	144 ³	58	164 ⁴	125
18	24	"	45	8	102	13	120
19	33	Aortic	...	...	60	15	114
20	59	"	...	...	59	4	60
21	50	Mitral	23	21	44	7	58
22	21	"	20	3	44	16	78
23	33	"	25	15	35	19	83
24	27	"	15	13	22	4	24
25	42	Mitral and degenera- tion of heart	20	6	15	6	28
26	41	Dilated heart and granular kidneys	27	7	23	3	26
27 ⁵	74	"	?	?	?	?	?
28	40	Mitral	32	2	20	7	40
29	33	Emphysema and bronchitis	? 20	?	109	9	278
30	29	"	13	5	25	10	52
31	32	Pleuritic effusion	30	5	52	8	88
32	48	"	...	...	63	13	104
33	16	"	...	...	38	9	64
34	43	"	...	...	41	8	64
35	35	Chronic nephritis	46	12	88	13	142
36	37	Tubular nephritis	25	4	43	14	60
37	31	"	47	31	37	6	110
38 ⁵	46	"	?	?	?	?	?
39	52	Tubular and inter- stitial nephritis	...	...	21	5	24
40	15	Lardaceous kidneys	50	1	91	8	120

a, b. First and second series of observations in the same patient.

¹ Excluding the first four days and taking in one day after paracentesis.

² These consisted of two short intervals in the course of the copaiba treatment.

³ The sum of six periods.

⁴ The sum of five periods alternating with the above.

⁵ Observations not detailed enough for purposes of tabulation.

CONSIDERATIONS ON THE CURES IN INSANITY.

BY GEORGE H. SAVAGE, M.D.

IN the following paper I purpose collecting together facts that have struck me in connection with the prognosis in insanity. The paper is the result of experience at Bethlem, and is not intended to be exhaustive. I know the general want of faith in cures from an asylum, and unfortunately I also know how often relapses or recurrences justify this unbelief. Yet I shall have to point out cases that have lived their lives and spent them usefully after having had severe mental attacks. And again, we must remember that "as the evil that we do lives after us," whilst the good is forgotten, so the prejudice against asylums is such that persons who have been under treatment and have recovered hide the fact from all whom they can. I know of cases that have been discharged from Bethlem, have married, and had families, their husbands or wives never knowing that Bedlam was the skeleton in the closet. The persons who impress one most are those who return time after time, and thus a false impression is made.

This want of faith will never be lessened till more of our profession know something practically about insanity, and they will be teachers to the public. At present our pro-

fession is ever ready to provide witnesses to the fact that a man who has once been insane is always subject to insanity. This is taking insanity with all its causes and in all its forms as one state, and this is a mistake.

I shall have some difficulty, I fear, in pointing out why some symptoms are more favorable than others, and why certain forms of insanity leave deeper scars than others, yet by pointing out the conditions of age, sex, &c., that are favorable, and also those that are unfavorable, I shall enable readers to judge approximately of the chances of recovery in any particular case. The basis of my statistics is formed by the annual returns of Bethlem Royal Hospital during the last ten years, from 1865 to 1874 inclusive.

In some cases where I considered personal observation of the facts necessary I have taken the last 600 admissions during the three years that I have been in charge of the case-books.

I intend first briefly to glance at the different processes of cure we meet with. The cure may be gradual or sudden. It may be simply progressive, or it may be vibratory, if I may use the term; by this I mean that the case may pass from a state of depression to one of exaltation, or *vice versa*; and such actions and reactions may occur several times, each time the curve of depression being less, till the right line of health is reached.

In gradual cures we have several varieties.

We have cases of mania or melancholia that gradually improve both in mind and body. The hallucinations become less distinct, and the delusions less real and more easily combated. Sleep becomes more sound and dreamless. The vague pains in the head are less distressing. The appetite becomes more natural, the secretions healthy, and the skin and hair assume a normal condition.

There are perhaps more cases that vibrate: some of these oscillate between depression and exaltation, others only from the healthy level in one direction or the other, being well for a short time between the intervals of disease.

There is almost always some depression after very great excitement; and though many cases of melancholy recover without any true excitement, yet, if the melancholy be

profound we expect to have some exaltation before the level of health is reached.

Thus one case in at present; for four months we could not get a word from him; he gradually improved, but now is too full of life. He is unnaturally gay, and we dare not discharge him till this has passed off.

Some cases have only one fit of excitement followed by one of depression before recovery; but a greater number have several transitions, each less marked than the former, till health is established.

The chief difficulty in these cases is to be sure that each attack is of less intensity than the former, or of less duration, for otherwise we may be expecting recovery from a hopeless case of folie circulaire.

Some cases, again, have a hard struggle before reason is finally ruined, having attack after attack, each leaving the patient mentally weaker.

It is common to see patients as they recover doubt the justice of their detention; I look upon this as a stage of cure. We so often see it expressed in the earliest letters of a recovering case, and yet before they leave they are not only satisfied but grateful.

It is an asylum axiom, that a patient is not well as long as he thinks his seclusion unjust.

When there are alternations of excitement and melancholy it is dangerous if the periods become longer and longer at each attack. In women, if the periods coincide with the menstrual periods, there is great danger of a chronic insanity resulting.

The next subject is the prognosis in sudden cures. These are no more likely to relapse than other cases, at least that is my experience.

Some forms of insanity necessitate sudden recovery if any. Cases of acute primary dementia suddenly begin again to remember and to be reacted upon. After weeks or months of oblivion the change is almost always sudden.

I have known one patient whose earliest recollection after four months of dementia produced by fright was of the continuous galvanic current passing through his head. He was not, however, perfectly well for some weeks after that impression.

Certain cases lose their delusions in a night, or even in a short day-sleep.

Other cases quite suddenly lose their delusions, and frequently lose them for good.

It is not uncommon, however, for cases to lose delusions or hallucinations at certain times of the day, the onset and the relief being sudden.

Every asylum physician is used to cases of sudden cure. I look upon many of these cases as hysterical, and we shall consider them more in detail when we examine into hysteria. In a few the sudden cure may be due to a gradual process that at a certain moment is perfected. We see in most sudden deaths that it is only a very slight change that is sudden; the degeneration of heart or of artery has been going on for years and making its signs, though these have been overlooked: and so in the process of cure the readjustment of the balance may appear sudden, though grains have been added and added to the scale quite unperceived till the equilibrium was reached.

The more common form of cure, and the more common adjustment of the balance, is by a swing past the state of permanent equilibrium.

Our ancestors very probably were most impressed by these sudden cures, and were led to false methods of treatment in consequence. They supposed that by means of shocks and such rude measures the devil of insanity might be cast out. Shocks are never tried as means of cure now, unless we look on the shower-bath in that light. The day of surprise-baths and rotatory chairs is gone.

The shock of coming to an asylum is sometimes quite enough to re-establish the sanity, but as a rule such cases have been improving steadily in general health before admission. A certain number of cases who are irritated and worried at home rapidly improve on admission, and remain well after.

I have seen several cases of women suffering from the insanity associated with childbirth suddenly recover and remain perfectly well afterwards. In one of these, two symmetrical abscesses formed in the calves of the legs, and on opening these and securing a free discharge, the patient's sanity and only had to gain physical strength.

Another case of considerable interest is that of Mrs. S—, æt. 32, married. Three days after delivery, both milk and lochia being abundant, she became most furiously maniacal and suicidal. She was brought to the hospital eight days after delivery, and was in a most exhausted state, and still refusing food. Her urine had to be drawn off once or twice. Bowels confined. Temperature only once as high as 101° , generally about 99° . The patient continued troublesome, and exhibited no mental change till three weeks after admission, when one day after dinner she said she felt well; from that time she remained well, and is now at home. There is, of course, the usual risk in her case of a recurrence with future pregnancies.

In considering sudden cures we must remember that in some cases of recurrent mania the remissions are sudden, and even in the same patient one attack may come on suddenly and the next be preceded by a warning.

This is a convenient place to mention the cases that mask their insanity and may thus appear to have made a sudden cure. A patient seeing that he was kept in the hospital as long as he said that he was God and that he was able to create and destroy, astonished us one morning by telling us he had lost all his delusions, and even laughed at them himself. For the rest of his stay in Bethlem he guarded himself against his delusions; and I may appear to propound a rash theory, but I feel sure that his cunning in reality cured him. He continued to have hallucinations of hearing, and to imagine that he held communion with God, as we heard from his wife and those whom he did not care to deceive: moreover, on watching him narrowly we could detect his deep breathing, which he called his "spiritual talking;" but by curbing the display of his feelings he seemed in the end to check their origin, and after most careful watching and sifting, and trial by leave of absence, he was discharged perfectly well.

As a rule the prognosis is bad in these cases that suppress the false impressions they have of actual sensations. They have sense enough to see to their own welfare, and are very likely to settle down into a chronic state of delusion. They establish a new mental world of their own.

These masked cures are not infrequent in another class of

dangerous patients, viz. those who are suspicious and fancy that other people are tampering with them. They will deny that they dread you or your influence just as a small coward will brag and boast to cover his cowardice. We have a young patient now in Bethlem who daily denies that he has any suspicion of being tampered with, but we cannot be in his company half an hour before he becomes quite violent and abusive on account of his belief that he has been so treated. At first, when I only devoted a short time to his case, I was inclined to think that he was really better.

We have now to consider the general conditions that help us in our prognosis, such as the age and sex of the patient, the duration of the attack, the accompanying physical ailments, and similar data, adding to the statement of our opinions the facts upon which those opinions are based.

After the consideration of general conditions I shall refer to the bearing of certain symptoms, mental and physical, on the prognosis.

Next I shall consider the prognosis in relation to the form of disease. In this I shall avoid as much as possible any elaborate classification, as I am so confident that at present we had better be careful observers than industrious class-makers.

As an appendix to the above questions I shall add an examination of the cases that have relapsed during the past three years, more especially in reference to those cases that have been readmitted into Bethlem, and also I shall consider those cases that have never recovered from their first attack of insanity.

The subject as thus sketched out is of large extent, but of sufficient interest to require careful reading as well as laborious writing.

In the first place, then, during the last ten years 852 male and 1222 female patients have been admitted, making a total of 2074; during that time 367 male and 717 female patients were discharged cured, making a total of cures of 1084. This is 43 per cent. of cures on the male admissions and 58·67 on the female admissions.

I have compared the cures with the admissions, as that
most trustworthy method if a term of years

be taken. The percentage is higher than is usual in tables of cures in insanity from the fact that, the institution being rather an hospital than an asylum, we are enabled to select our cases. Taking single years the percentage has been much higher than the above; thus in 1873 we had a total of 55 per cent. of cures male and female, and in 1874 we had a total of 65.5. We see that more females are cured than males, and we shall refer to this again, at present merely observing that in the ordinary way one third of asylum cases get well enough to be sent home.

We next have to look at the ratio of cures in several forms of insanity. We shall have to consider these more fully later, and point out differences or sub-classes in the groups of cases. We shall only take the percentage of cures during ten years among the cases of mental exaltation and those of mental depression. Taking the male and female cases together, I find that 59.57 per cent. recovered of those suffering from mania, and 56.66 per cent. of those who were melancholic.

The difference is less than I expected. My general impression was that we had a much greater percentage of maniacal cases cured, but the fact that the cure in melancholia is a slower process may account for a false impression.

In other forms, such as acute primary dementia, I have not trustworthy statistics for above three years, and we have had comparatively few cases, but the percentage of cures was as high as 56 in one year. Most of our acute cases of primary dementia were connected with pregnancy, and on that account were favorable. Besides these, we have had several young cases due to shock who have done well.

Cases of illusional insanity are unfavorable, nearly all cases of epileptic insanity are unfavorable, and all cases of progressive general paralysis end fatally sooner or later.

It is to be observed that cases get well in much larger proportion if they have been sent to an asylum early. This is a most vital point and one that we are never tired of bringing before the public and the general practitioner. It is false economy—if done for economy—to keep a patient in a work-house or at his private house when he is distinctly insane.

My experience completely corroborates that of Dr. D. H. Tuke, at 'The Retreat,' that over 70 per cent. of cases

admitted within three months of the first attack get well, whereas of sufferers from a first or other attack admitted to an asylum treatment twelve months after the onset not 20 per cent. get well.

It is impossible, or almost so, to get the same uniformity and organised work and attention in any place other than an asylum; and though I would oppose the admission of hysterical cases as strongly as any one, yet for the truly insane home treatment is generally a mistake, and a mistake that is irredeemable. The time for cure is early, and if past may be past for ever.

Incidentally I would say that the prognosis is not absolutely bad when patients have been already discharged uncured and incurable from one asylum. I have many times been annoyed to hear of patients who, after all our care and trouble, have not benefited and yet have recovered on removal to rougher quarters and harder fare. The same thing is brought out by the fact that from the Metropolitan Asylum at Leavesden, where only presumably incurable patients are sent, some are every year discharged cured, as I am informed by my friend Dr. Claye Shaw.

For the above reason I think one is not only justified but encouraged to send to other asylums those cases that we have failed in curing at the end of a year. The changed surroundings make a difference in a fair number of cases.

1. We will now examine into the influence of *additional physical ailments* upon our prognosis. Asylum physicians get into the habit of condemning cases from trifling complications that are really signs of deep organic change. As we have before remarked, epilepsy as a complication is most unfavorable. If at the onset of epilepsy the early and judicious rest and withdrawal of general education be rigorously followed, the patient may get over the mental symptoms as well as the epilepsy. We have to consider epilepsy in several relationships in insanity. Thus, the mania of epilepsy, either occurring before the fit or more commonly after it, is so distinctly connected with the fit that if you can control the fits you may control the mania. The mania is dangerous and transitory. The prognosis is unfavorable as far as cure goes, and generally the mental faculties

are rapidly injured. The weakening of memory and mind generally following epilepsy is, like all forms of gradual mental loss, very unfavorable. The more frequent the fits, as a rule, the more rapid the degeneration. I have not sufficient evidence to speak authoritatively as to the prognosis in masked epilepsy, but I believe this is less dangerous to the mental powers than epilepsy with fits. As a rule, when epileptiform fits appear in general paralysis the end is approaching; but, on the other hand, I have seen a case in which fits appeared as almost the earliest symptom, with exaltation of ideas. This patient got over the fits, and lived gradually on into dementia for three or four years.

Our prognosis of the epilepsy of insanity depends very much on the physical cause of the epilepsy. We know, if this be due to a wasted convulsion, we cannot fill up the wasted matter, and the prognosis must be bad; on the other hand, epilepsy from a syphilitic tumour may be possibly cured. In one case I have seen an epileptic fit precede cure. The case was as follows:

Louisa J. H—, single, æt. 28, shopwoman. Father died of "brain-softening" and apoplexy, sister hysterical. Admitted two months after the onset of the earliest symptoms. She was suspicious, and fancied people watched her; heard voices; was sleepless; emotional; her bowels constipated. On admission she was in weak general health, and we at first suspected phthisis, but could find no evidence of tubercle. She was wretched and refused her food. She improved in general health, but there was no corresponding mental change. She continued to be solitary and to talk to herself. One evening, a month after admission, whilst in the garden, she screamed and fell on the gravel path quite insensible. She bit her tongue and was generally convulsed. Within three minutes of the fit she had very many petechial spots over her face, the largest number around her eyes. She fell asleep after the fit, and when she awoke the next day was mentally brighter. She had two large subconjunctival effusions of blood, and over her cheeks several miliary spots appeared. The improvement was slow in mind, but bodily she rapidly became well. She had had no fits before, and has had none since. She

was convalescent within two months of the occurrence of the fit, and has since kept well.

Next to epilepsy loss of power over the bladder must be looked upon as a grave symptom. In many cases it, of course, means that paralysis has progressed so far and is beyond arrest. In other cases the passing of urine carelessly rather than involuntarily is the result of mental torpor, as seen in cases of dementia, primary and secondary, and in melancholy with stupor. In men its import is worse than among women, as general paralysis is more rarely seen in women.

In cases of acute primary dementia only is there a prospect of cure when this symptom is present by day as well as by night. One may be, however, misled by a maniac, who cannot or does not care to explain his troubles. We had one patient last year who passed his water both by day and by night under him, and we gave an unfavorable prognosis chiefly from this symptom, associated as it was with buoyancy and exaltation of ideas. The patient became more rational, and then told us that he had been subjected to lithotripsy, and this was the cause of his incontinence. He has been discharged since, and is now following his occupation.

The enuresis may be due to bladder irritation in persons who are mentally weak, and who will neither attempt to control their desire to micturate nor trouble to use the proper conveniences. We had a patient who died of phthisis with melancholy in Bethlem who for years had had trouble about her water. At first she wetted the bed at night, but later she lost all control of her bladder; after death we found phthisis renalis, with great dilatation of the ureters and inflammatory thickening of the walls of the bladder.

An asylum is a little world, and we find in it all the varieties of paralysis that can be found in a general hospital. All progressive paralyses are unfavorable. Cases have been described of mental excitation connected with locomotor ataxy, and I have seen several cases in which after acute mental symptoms considerable muscular atrophy has occurred. On the other hand, we have many in which progressive muscular wasting is accompanied by steady mental weaken-

ing; and in these we find the brain much wasted. The characters of this muscular atrophy in my experience are, that it is more general than that classed as progressive muscular atrophy, and that it affects a limb or limbs, affecting both flexors and extensors equally, so that the former assert their power and flex the wasted limb. Again, this atrophy is not a symptom of a disease that is likely to be rapidly fatal. It may last for a very great number of years.

A grave symptom is the association of apoplectic symptoms with insanity. A certain number of cases come under care in which the insanity depends on the apoplexy; either the extension of irritation from a clot takes place or the symptoms are due to a similar state of malnutrition to that which causes the softening. Besides this, it is not uncommon to have insane patients die apoplectic. Atheroma of the arteries is as true a cause of insanity as of apoplexy. I have seen some of the most extensive extravasations of blood among the insane.

It is hardly necessary for me to point out that we get cases of paraplegia, the most common next to the general paralytics being those in whom senile changes are the cause of the paralysis. All the senile symptoms are unfavorable, for if they are present, whatever the age may be, "the time to die" has nearly arrived.

We shall consider hysterical paralysis in detail, and here need only say that we are rarely without such cases. They generally get well in an asylum, but should not be sent there.

The presence of hæmatoma auris is considered to be a bad sign. This complication is so uncommon in Bethlem that I cannot speak strongly on the point. I have never seen one of our cases get well after developing it. In the cases I have seen it in there were plenty of other unfavorable symptoms to fix one's prognosis without the ear, and I have not so far met any case in which the ear alone caused me to alter my opinion already formed.

Again, irregularity of pupils, though a symptom of great importance in many cases, must not be accepted as pathognomonic of general paralysis. If with other symptoms, such as exaltation of ideas, more or less tremulousness of tongue and facial muscles, and especially a regular increase of temperature

at night of one or two degrees, we get also irregular pupils, the diagnosis is general paralysis and the prognosis bad.

It is common to find great dilatation of the pupils in many cases of mental disease—in cases after childbirth and also those associated with masturbation and over-lactation, in fact in conditions of great exhaustion. These cases are generally favorable and require a stimulant form of treatment. Thus, I have found preparations of phosphorus useful in such cases. I have seen a fallacy in the prognosis of cases from irregular pupils, and as one's mistakes are the most useful of one's experience I add them.

John T—, æt. 37, married, late a ship's steward, now a publican ; of sober habits ; no neurosis in family ; said to have had a sunstroke in India. About six weeks before admission he began to be extravagant with his money and his goods. Two weeks before admission he said he was worth millions, talked of injuring his wife and friends, was free in his conversation about royalty. He next was said to have had a fit, but he was not unconscious in it, merely making a peculiar noise and signs as if he would injure those near to him ; on recovering from this state he said he had only been shamming. He slept badly from this time till admission. On admission this patient was very excited and noisy ; he was in fair general health and had no marked tremor. The left pupil was much dilated, the right being very small ; sight in the right eye was very feeble. We formed a bad opinion of his case, but hesitated to consider him a general paralytic till we had examined the condition of the eyes more carefully. We heard that he had had some disease of his right eye in India, which proved to have been iritis, that had fixed his pupil. In meeting such a case in a single consultation we might easily have been misled. The patient was discharged greatly relieved, being quiet and well behaved, but we did not consider him as cured, for his memory was decidedly affected.

The next case is somewhat similar, only the patient is older and the disease is undoubtedly general paralysis.

John H—, æt. 57, married, a soldier who has served in several campaigns. There is some history of insanity, though

not very near, in his family. His first symptoms were losses of consciousness seven years ago ; has complained of headache for some time past ; had an injury to the head, and the line of fracture can be felt ; had cholera in India and some affection of his eye. On admission he is an old-looking, excitable man, who is constantly talking of his greatness, past and future. His memory is failing ; he mistakes the persons about him for friends and relations, making most foolish errors—thus, he will claim as his son a person as old as himself. There is some tremor of the tongue, so that he supports it on his lower lip and chin when asked to put it out. We decided the case to be one of general paralysis, and found his right pupil much smaller than the left ; this proved to be due to old iritis.

A condition that I look upon as a very hopeless one is where the hands and feet are always congested and blue, the superficial vessels being distinct ; the nose is often similarly affected. In my experience it is rarely or never seen in cases that have not been insane for two years, and is best seen in regular chronic lunatics, those that have no period of health. In these cases we often find a vigorous left ventricle and a want of tone in the arterial walls, the blood seeming to be pumped along only slightly elastic vessels. Contrasted with this congestion of the extremities and of the nose we have also to notice that many chronic patients develop or modify their features, so that they become rather thin and refined. I take occasion constantly to point out the large proportion of thin, aristocratic noses that we find develop in our asylum among the incurable cases. Darwin has referred to the state of the hair in the insane, and, as a rule, thin, wiry, dry hair is found more often in chronic than acute cases, and therefore, in many cases, points to the smaller chances of cure. I have seen several cases in which the hair was in a most typically electrical condition, and yet the cases have got completely well and have remained so. I am inclined to think that in many female chronic cases there is a tendency to develop hair on the upper lip and chin. This requires confirmation by those who have large fields of chronic insanity open to them before I would speak confidently about it. I have

seen it in not a few of our incurable cases, both the chronic demented and the sufferers from recurrent insanity.

It is an evil sign when a patient gets fat and well favoured, but gains nothing or only slightly mentally. This is axiomatic, but I find many cases of insanity of childbirth gain physical power long before they gain mental power. This, too, occurs in many cases in which I should consider the insanity due to anæmia. Thus, patients may pass from a condition of weakness to one of moderate strength, acute dementia persisting or passing into some hysterical form of insanity, and yet the end will be cure. I have seen a woman with puerperal insanity fat and flabby for nearly two years before any real mental change took place. If, however, in an ordinary case of mania or melancholia great bodily improvement takes place with no corresponding mental change, the prognosis is bad. In acute primary dementia I have seen a fat though flabby condition precede recovery by some months. In general paralysis it is usual to get a stage of fatness, which is not unfrequently the precursor of fits. So much is this the common observation of attendants that they talk of "feeding for a fit."

2. The *cause* of the insanity is in some cases an important help to the prognosis. We almost always have great difficulty in tracing with certainty the attack to its true cause, and are obliged to consider predisposing and exciting causes. I look upon hereditary taint as the most marked cause, but it is difficult in many cases to bring this home. I have seen cases in which no true insanity existed in either parent, but yet such a peculiar nervous constitution that the whole of the offspring was insane. We have such a case in a young man in Bethlem at present. This is his second attack of acute mania, and he has a brother and sister who are also maniacal. Yet both parents, though odd and excitable, manage to fill their posts in the world.

We have found it necessary constantly to refer to the influence of hereditary taint on the prognosis, general and special, and I only think it requisite to give the statistics from the last 600 admissions into Bethlem. Of these, 248 were males and 352 females.

Of the males, 85 were known to have had near relations

insane, that is, over 84 per cent., and among the women 140 owned to insane relationships, that is, rather over 89 per cent.

The more carefully the history is taken the larger is the proportion of patients found that have the insane inheritance.

It is said by Dr. D. H. Tuke that physical causes are the most dangerous in women, and moral in men, but I cannot say I have found any well-marked distinction. In women we have naturally very many additional causes of physical exhaustion and irritation; but, again, they seem more tolerant of some excitants, especially the sexual ones. I have seen very many cases of general paralysis due to sexual excess in men, but among women, though excess is at least as common, this result is rare. I have the history of one female general paralytic who was said by her husband to have been of a most erotic nature till the paralysis showed itself, when the desire ceased altogether. This case is interesting in that the patient had two husbands before she was thirty, but no children, and her delusion of grandeur was that she was to be delivered of triplets. I have seen at least one other female general paralytic with delusions as to pregnancy.

Cases due to sexual excess are markedly of two types—those due to a great and sudden excess, under which class we would put the so-called cases of post-connubial insanity, and those due to prolonged excess that seem to end in general paralysis. I have not seen many of the former, but those that I have have generally done well when that was the only cause. I have notes of one young man, an actor, who after marriage with an actress gave himself up to great excess, and was admitted in a weak physical condition and suffering from acute mania. He was of a neurotic but not insane stock, and had been married only about a week. His appetite was large, but his excitement kept him thin. For several months he remained unchanged, then became quieter, but still talked to himself, and we began to fear for his recovery. About seven months after admission he began slowly to improve, and at the end of nine months was discharged in robust health and quite well mentally. Since then, three years ago, he has followed his profession.

In other cases I have seen more depression or even acute

primary dementia. I think a judicious use of stimulants and tonics will cure most of these cases. If, however, as sometimes happens, epileptiform seizures have occurred, I think badly of them.

Masturbation is very difficult to speak of in its relation to the prognosis. It is so common as a result of insanity that I hardly know in which cases to consider it as a cause. Here, too, we get cases that differ much in their symptoms. Dr. Rhys Williams considers that young cases that have hallucinations, especially of hearing and sight, are cases in which masturbation plays the chief part as cause. Very many patients that come in exhausted and anæmic, with dark areolæ round their eyes, recover and tell you they themselves consider masturbation to have been the cause of their illness. But masturbation acts in such a compound way: it exhausts when practised to excess, it makes the patients think very lowly of themselves, and if, as often happens, they are of some strict religious sect or profession, they gradually become the prey to the idea that they have sinned beyond forgiveness. To them it is so pleasurable and so patently a sin, and a selfish one, that they consider they are sinning against light and without hope. Such cases come under the head of religious melancholy and are unfavorable. Masturbation, also, is practised by many general paralytics, and occasionally by persons in puerperal insanity. In the former the vice will pass away as the patient becomes weaker, and in the latter as the irritation about the genitals eases.

On referring to tables for ten years I find 43 were admitted for insanity due to masturbation; this is a small number, but I think expresses only those cases of which there was little or no doubt as to this being the cause. Of these, 1 only died, 17 were discharged cured, and 21 discharged uncured; the other 4 were either still under treatment or removed for special reasons.

I shall only consider a few other general causes that merit particular notice, and then pass to the general results from physical and moral causes. Yearly we have cases said to be due to sunstroke; in fact, nearly every case that is sent to us from the tropics is supposed to have had *coup de soleil*. If the case be one of genuine insolation it is almost hopeless.

The prognosis in cases following injuries to the head is unfavorable. Many cases are admitted after falls and other injuries, the fall being due to general paralysis that has first shown itself in the limbs. Cases due to acute diseases are generally favorable, as are also those due to childbirth, if the attacks are not too often repeated; each additional attack as the result of puerperal conditions is more dangerous, thus differing much from the acute attacks recurring from ordinary causes in persons predisposed by heredity. In these latter I have seen patients over sixty years of age recover in a few weeks from a tenth or even fifteenth attack, whereas few of the puerperal cases I have seen have got over more than three or four attacks. Cases following fevers and pneumonia nearly always recover, and I have notes of cases that have had no relapse after twenty-five years.

Of our 2074 cases admitted during the last ten years we have the supposed cause given in 1548, leaving 526, or more than a quarter, unaccounted for. Of the 1548 cases 797 were said to be due to moral causes and 751 to physical. We saw before that of our 2074 admissions we discharged 1084 cured; of these we find 779 had causes assigned for their madness, and of these 779, 402 were moral causes and 377 physical. Of 447 discharged uncured 265 were said to be due to moral and 182 to physical causes.

Of 166 deaths during the ten years the insanity was caused by psychical in 116 cases and bodily in 50 others. Tabulated the figures stand thus:

During ten years (1865-74).

	Admitted.	Cured.	Uncured.	Died.
Insanity due to psychical causes	. 797	402	265	116
" physical "	. 751	377	182	50

I have also drawn up a table to show the relative proportion of cures, deaths, &c., to admissions of the men and women who have been in Bethlem during the last three years in which I have kept the case-books. There are some not accounted for, as they are still in hospital.

During three years.

Psychical causes for insanity—

Admitted.				Cured.				Uncured.				Died.		
M.	F.	Total.	...	M.	F.	Total.	...	M.	F.	Total.	...	M.	F.	Total.
126	186	262	...	57	75	132	...	50	33	83	...	20	12	32
Physical causes for insanity—														
52	103	155	...	18	64	82	...	16	21	37	...	5	16	21

Thus, we have of the 126 males admitted with distinct moral causes of insanity 57 cured, that is, 45·2 per cent., and of the women, 136 admitted and 75 cured, or 55 per cent. Of those admitted suffering from physical causes of insanity 18 out of 52 males recovered, that is, 34·6 per cent., whereas of 103 women 64 recovered, which is 62·1, or nearly double the male percentage. If we look to the last figures in the table we find that the deaths among those admitted from physical causes are, however, much more numerous than those from moral causes.

Although I have left many points untouched in the class, yet I think enough has already been said if I add that certain moral causes, such as love and religion, act more forcibly among women than among men. Very many of the so-called erotic cases are unfavorable, especially if they develop in middle-aged single women.

As to mental overwork and mental anxiety, these are so often associated with “*res angustæ domi*” that I cannot pretend to separate them. Overwork is so often given as a cause of general paralysis, and is so associated in most general practitioners’ minds with “softening,” that I am not surprised to find the cases so classed remain uncured. A few persons do break down for a time from having wrought for too many hours at the same monotonous labour, and these are hopeful cases. Rest and relaxation will cure them.

Other physical causes will be considered later. Thus, the climacteric and puerperal cases, the cases due to syphilis and fevers, will be considered in their special classes.

3. *The influence of the age of the patient on the prognosis.*—As a rule, young cases, other things being equal, get well more rapidly than older ones, but any form of mental disease coming on before puberty is very dangerous to the

mind. Generally mere children's mental diseases are simply processes of destruction of the small brain edifice that has already been built. When a child of four or five has epileptic fits or mania the end is usually rapid imbecility or acquired idiocy. It is rather uncommon to have acute mental symptoms in young children, but I have seen acute mania in a boy of four years of age.

We constantly hear of young cases of suicide, and I have seen girls of twelve who have alarmed their friends by threats of self-destruction, but as a rule our young patients at Bethlem are maniacal or hysterical. These cases get well in a large proportion, but are very liable to relapses. We have had recently three young patients under our care, one of whom has been twice in Bethlem, one was discharged uncured at the request of the friends, and one is now awaiting her discharge well in mind and body. I append a few particulars of these cases, as they are typical.

The first case did not come to us particularly young, for she was eighteen years old on admission, but she is a good example of precocious genius, which is not unfrequently associated with insanity. She had displayed great literary ability at a very early age, and had been pampered and spoilt since then, so that, though she had some brilliant parts, they were quite masked by her want of ordinary education. She had a strong taint of insanity on the maternal side, her maternal grandmother dying of puerperal mania and her uncle of melancholia; her mother is odd. On admission she was suffering from a form of melancholia, and at times had outbreaks of violence. She became quieter, but was silly and unoccupied, and was discharged "cured," as her mother said she was quite in her natural condition. She was not away from the asylum a year, and was brought back in a similar state to that on her first admission. She improved slightly, and was removed contrary to our wish by her mother.

The case of the boy is similar in the fact that after a speedy cure there was a relapse. In this case there was no hereditary tendency. The first attack came on when the boy was only fourteen years of age, and was said to have been caused by shame at being detected in theft. He was maniacal and excited for a time, but rapidly improved, though at

his best he was rather a mischievous lad. He was discharged well at the end of four months, but was readmitted eleven months after for a similar attack, which for a time was less marked, but became after a short leave of absence at home more distinctly maniacal than ever before. For about ten days he was noisy at night and sleepless; had also a most exaggerated idea of his powers and importance; he seemed in a day to have developed from a schoolboy into a man. He again became quiet and is now convalescent. He will probably be subject to sharp attacks like the above all his life and yet may live long.

The other case we shall consider more in detail under hysteria. The girl was hysterically insane at thirteen. She had menstruated at eleven and a half years, and was much overgrown. She has now gained much strength of body, and may very possibly keep free from asylums if no specially hard fortune falls on her.

I annex a table of the ages of the patients admitted and the respective percentage of cures.

	Admitted.		Cured.		Percentage.
Under 25 years . .	578	...	349	...	60.38
25—50 . . .	1166	...	608	...	52.14
Over 50 . . .	307	...	122	...	39.07

Thus, it will be seen that the age is an important point, for whereas the difference is not great between the first and second periods, considering that there are twice as many admissions during the latter, we find, on examining the third period, that the percentage of recoveries is scarcely two thirds of that in the first. There are several classes of cases that depend for their interest on the age at which the insanity occurs. These are—the young cases occurring at the onset of puberty already considered; the cases associated with the climacteric, which are more common in women, though occasionally present in men; and the senile cases also considered in part elsewhere. From 35 to 40 per cent. of the climacteric cases recover. The climacteric is dangerous to persons who have had previous attacks of insanity, especially, I believe, if these have been of puerperal origin. Many puerperal cases become demented before the climacteric, and not a few become so then. Climacteric cases not unfrequently become

dipsomaniacal, and we have had several admissions among women during the past year, in which a tendency to drink and great jealousy were the most prominent features of their disease. The following observations will exhibit more clearly the nature of the aged cases that get well and those that die.

Charles F—, æt. 78, admitted in 1873. His first attack was in 1865, when he was sixty-five years of age. He was then most acutely maniacal. A sister had been insane. He recovered, and was discharged well after fifteen months' residence in Bethlem. His second attack was also maniacal, but he died of exhaustion after two months.

Walter K. K—, æt. 67, writer for the press. No hereditary taint. First attack. He suffered from delusions, weakness of gait, some drawing of his face, excessive sweating of right side of head and face, and was evidently a worn-out man. He never rallied, and gradually sank under an attack of pneumonia three months after admission. No mental improvement before death.

As contrasts to the above are the following recoveries :

Jane G—, widow, æt. 71, admitted 1873. A brother had been in Bethlem. Had had two previous attacks similar in character. First attack at fifty-eight years, cause unknown. Very melancholy. Twelve months' residence in Bethlem completely restored her.

Ebenezer C—, widower, æt. 67, second attack of melancholia. The first occurred twenty-three years ago and lasted nine months. Grief at the loss of his wife was the exciting cause of this attack. He was very much depressed for some months, but gradually improved, and was discharged cured at the end of eleven months.

Thomas H—, æt. 58, married, no hereditary tendency to insanity; money losses and religious excitement were the supposed causes of insanity. He was extremely maniacal; noisy both night and day; with foul and dry tongue and slight increase in general temperature, 101°; he took enormous

quantities of food. About six weeks after admission he became quiet and steadily improved ; was discharged well.

Other aged cases improve up to a certain extent, but never regain any power of mind ; their memory fails, they become more childish than is usual in extreme age, and in this state they may live for years.

4. My next consideration is the relationship of *sex* to the prognosis. We have already seen that of 2074 admissions 1222 were females and 852 males, and of the 1084 cures in ten years 717 were females and 367 males. Thus, we have an excess of females admitted and a far greater percentage of these are cured. Among women we have a larger proportion of emotional cases that are more curable ; I believe we have also, on the other hand, a larger number of relapses among them. We have also a larger number of suspicious cases in women, and these are not favorable. We have several in at present suffering in this way. They are single women or widows, and they are ladylike, tidy, and often to all outward appearances well. As long as they are under lock and key they are contented, but allow them to go into the street and their delusions are at once brought to light. They imagine they are watched or that their enemy is waiting for them. Such cases occur in men, but we see more of them in women at Bethlem.

Another unfavorable class of cases is that in which they imagine that they are being tampered with, that indecent liberties are taken at night, or chloroform administered to render them insensible whilst they are being raped. Such delusions are more common among women than men.

Exalted ideas among men are usually of bad import, as these are so often associated with the earlier stages of general paralysis ; ideas of a similar nature are not uncommon among women, and in them are rarely associated with general paralysis. Women with these ideas are generally young and unmarried. They seem to have spent so long in "castle building" that their airy castles have become to them real, and this deep-fixed nature of the delusions is unfavorable.

Ellen B. C—, æt. 22, a governess, of very superior education.

No hereditary tendency, no known exciting cause of insanity. On admission she was neat in dress and appeared to be in good general health. She had ideas that she was related to the royal family, but refused to talk about it, as she supposed we knew all about it, and were rude in not acknowledging it. This patient became more and more self-contained, and grew fatter and more lazy, and at the end of twelve months was discharged uncured. This is but one example from many similar cases having unfortunately similar results.

There are no special differences between the cases of acute mania or acute melancholia, as seen in both sexes. I have observed, however, a much greater number of cases of melancholy with stupor among women than among men, and but few of these cases have done any good.

Drinking cases are at least as bad in women as in men, and my experience is that there is even less chance of their recovery.

Women have special causes for insanity in their sexual functions, but these causes produce all varieties of insanity, and we must consider them together elsewhere.

5. The next general consideration is that of the *social state* of the patient—whether single, married, or widowed. I annex particulars of 1940 cases; in the rest of the admissions there has been some omission of facts, and therefore I exclude them. Firstly, those of the married—897 were admitted, and of these 529 were cured, 296 uncured, and 72 died. Secondly, of the single—912 were admitted, and of these 501 were cured, 279 uncured, and 132 died. Thirdly, of widows and widowers—131 were admitted, and of these 62 were cured, 50 uncured, and 19 died. These figures do not give any very precise indications, and have to be considered in other relationships, for there are many who have an insane tendency who are kept from marrying in consequence. Again, the strong have a greater tendency to marry and more choice, so that among the single we have an additional weak class and among the married a class above the average. Taking the figures as they stand, we find that 59 per cent. of the married are cured, 55 per cent. of the single, and 47 per cent. of the widowed. I am inclined to think these figures are almost too favorable in respect to widows; the stress that so

often falls upon them by their husband's death is very prejudicial to their recovery ; this is my impression, but I find on reference to my tables that the general percentage of cures among widows is nearly 45, and thus is not much below the figure already stated.

The above considerations are taken separately for convenience and to enable me to point out any special features that I consider important, but they are not to be supposed as distinct and isolated causes. It is very rare for one cause to produce insanity, and the influence of marriage is such a distinctly personal influence that no accumulation of tables similar to the above will give any real insight into the cases. There are cases in which I think marriage might do temporary or even permanent good, if an object in life could thereby be given ; but if there is a distinct tendency to insanity the risk of producing even worse evils and perpetuating the disease is cause enough to make one hesitate from even sanctioning such unions. Less evils would be done by begetting hobbies than children, and I trust more and more of these unsound persons may be developed rather into persons of one idea than parents of families.

I may here record the fact that during the past year we have had cases in which both husband and wife have been insane. In one instance the husband was the first to be attacked and the wife followed, melancholia being the form of insanity in each case. In another the wife was in Bethlem for hysterical mania and the husband exhibited similar symptoms. In neither instance were the husband and wife related in any way to each other. In the first, the husband and wife had been very deeply attached and inseparable companions till the husband's attack caused separation. In the second the husband and wife seemed to have married because they were equally weak and suitably sympathetic, and the catastrophe was not unlooked for.

To have an attack precipitated by the insanity of a near relative is tolerably common. We have at present cases under treatment in which the child's insanity has caused an attack in a parent, and one in which one sister's melancholia was the precursor of that of another.

6. Our next part will be devoted to the examination of

certain *symptoms*, both mental and physical, and we shall find some of them useful as guides, though they may be present in different forms of insanity. Thus, hallucinations are rather unfavorable symptoms when they occur in melancholia or general paralysis, and suicidal ideas are equally dangerous, whether due to religious delusions or to profound melancholia. Certain ideas and forms of thought have powers of burning their way into the nervous system, so that they are never got rid of, and we shall see that suicidal ideas have this tendency.

Every asylum has certain traditional sayings that are worthy of collection; they are registers of long experience. Among such sayings I consider as truthful the following:—Patients who make and wear rings of paper or thread are seldom cured. This may seem to those not used to asylums a rare example, but I can only say with us it is a very common habit, and generally is noticed in patients full of false ideas and affected falsely by their surroundings. In such cases the ring is often mistaken for a real token. Patients whose memories fail, as shown by their constantly “wishing you a good morning,” are hopeless as a rule. Those who have acquired marked tricks, such as touching the forehead, always holding a stick, and those who are always similarly occupied, as in window cleaning, are beyond cure. Cases that carry their own luggage to an asylum are unfavorable ones.

Patients suffering from acute mania often eat enormously, and many chronic maniacs still maintain very large appetites. An acute weakly case that takes food very largely, gaining in bodily health alone, is unfavorable. We have already said that bodily improvement without any mental, except in puerperal cases and others of extreme weakness and partial dementia, is unfavorable. Hence bodily grossness is a bad omen. The eating of *fæces* and rubbish is generally not a hopeful sign; the *fæces*-eaters get a sallow, unhealthy look. I have seen some cases of acute mania that for a time have eaten *fæces* completely recover. From simply dirty habits I do not think anything can be inferred, as one maniac may be dirty because he fancies he is painting a grand picture with paint and not *fæces*, and another, a deluded melancholiac, is dirty because he fancies his bowels are stopped, and thrusts his hand up to force a passage.

We have noticed that in many chronic cases the hair is dry, rough, and "electrical;" in most cases of this kind cure is very rare and very distant. I never saw a case retain this condition of hair when fairly on the road to cure. It is sometimes well marked for a time in cases that ultimately get well.

The so-called smells of acute and chronic manias are of no value, and I have failed to appreciate any special characters in these odours.

Steady loss of flesh in patients with acute mental disease is of the worst import. Certain cases of acute mania rapidly lose flesh, have an increased temperature, dry tongue, and die. Other cases of melancholia, though fed and well looked after, waste and are cut off by some secondary cause, such as pneumonia or bronchitis. Mere muscular wasting is common in many chronic demented, and is of no special importance.

Local palsies, unless they point to senile changes or progressive paralysis, are not noteworthy. The presence or absence of secretions and excretions is of importance. I have seen one case in which the patient is mentally well as long as she is suffering from a general eczematous rash, but becomes insane on its cure; thus, she has had three attacks of insanity, and three periods of skin-health. I have seen other cases insane after the suppression of a discharge from the ear or from the leg. We recognise certain cases, especially among the women, that are always invalids when not insane—one at present in Bethlem, a widow, who came in some eight months ago acutely maniacal; she was boisterous and amorous, and her appetite was good, though she was thin and worn looking. She slowly improved in mental condition and is now fairly well, having lost her exalted ideas and having again become quiet and ladylike; but she tells us she has prolapsus uteri with constant leucorrhœa, that she is hardly ever free from pain, and has been in this state for years; in fact, there have been troubles ever since her marriage; she has had none but dead children and severe miscarriages. This is but one of many cases that seem to struggle long with the physical ailment before they succumb mentally. Such cases generally recur, and are not favorable.

Many cases of mental disease are due to reflected or con-

ducted troubles, and so much is this the case that I can believe to a certain extent in the old heroic treatment by shocks. Thus, I have seen a case rapidly improve after a severe extraction of a tooth.

The cases with phthisis are most common ; the disease is an intractable one, and the mental disease is at least as obstinate. It is often associated with refusal to take food, and I suppose as long as irritation occurs at one end of the pneumogastric we may get troubles at the other end. It is hard, however, to explain how in some cases the mental condition improves as the phthisis gets worse ; this is only true in my experience up to a certain stage, beyond which I believe the two conditions go progressively, unless it be at the extreme of life that a faint gleam of reason returns. As to other diseases, we find that if hereditary taint is present in one parent, and some other tendency to decay, such as phthisis, in the other, the offspring stands a poor chance.

I have failed to discover any true rheumatic or gouty insanity. We have had many cases in with rheumatic fever, some who were recovering from this fever and had an attack of insanity, and others who have developed the fever whilst under treatment for insanity. I have records of one case in which a change of temper was noticed after an attack of rheumatic fever, and the change has persisted. Certain cases after rheumatic fever have a distinct course that is to be noticed ; they get valvular disease or adherent pericardium, and besides the cardiac symptoms they develop melancholia. Melancholia is the most common mental symptom with valvular disease and hypertrophy. This fact was pointed out by the late Dr. Thompson Dickson, though I think he extended the belief too far in considering heart disease common in melancholia.

Heart disease and melancholia.—William B—, æt. 25, single, ironmonger. Insanity on mother's side ; had rheumatic fever followed by chorea when a child ; for two years had been in feeble health and short of breath ; has got well and relapsed ; had hallucinations of hearing ; slept badly ; appetite has varied, and has been ravenous of late. He became better for a few days in Bethlem, then more moody and

melancholy. Palpitations and dyspnoea. He died after he had been six weeks in the hospital. His pericardium was adherent throughout; the aortic valves rough and incompetent. The whole heart weighed 33 ounces. Both lungs much congested. This case would have been more satisfactory if the heart disease had been the only factor, but there was also strong hereditary tendency, three of his maternal relations being insane.

I have several other cases in which chorea had occurred in early life, but where the heart was unaffected I could see no special relationship between the insanity and that disease. During the past year we have had one man admitted immediately after an attack of chorea, and his incoherence was most extraordinarily rhythmical. He got well of the chorea, and also of his mania. In another case hemi-chorea was associated with the insanity of pregnancy. The insanity got well before the delivery, but the chorea that was absent during her mental aberration returned on her recovery.

Nystagmus is not a common symptom with us, but nearly all the cases I have seen among the insane have been unfavorable. There was no similarity either in the symptom or the cause of the disease. One was epileptic, one was a chronic maniac, one a hypochondriacal woman, and another a general paralytic. Besides these I have seen several in general hospitals with this symptom in Charcot's sclerosis, with merely some mental weakness.

Change of life and senility have been already noticed.

Now, as to psychical symptoms, I have already adverted to exaltation as a dangerous symptom, especially in men; most of the patients who say they never felt so well in their lives, or are possessed of millions, end in general paralysis. This is not without exceptions. I have seen many cases who called themselves *Almighties* or *Princes* recover or live on as chronic maniacs. Among young women, too, exaltation, though a dangerous symptom as far as recovery goes, does not lead to speedy death.

An excess of emotion is not uncommon in acutely maniacal cases which get well, but in men I dread it as a not uncommon precursor of paralysis. We have one man at present in the hospital who, though he talks freely of his

coming honours, yet almost always ends in a flood of tears. He is a general paralytic.

Sleeplessness is a very common accompaniment of both mania and melancholia. In mania more often it is a noisy, busy unrest; whereas in melancholia it may be perfectly quiet, yet complete sleeplessness. One night's rest in either of the above cases is rarely followed by improvement. In fact, many cases of acute mania seem more violent after a rest. This is important to remember, for in these sleepless cases you cannot cure by simply procuring sleep. Unfortunately, the idea of the necessity of getting sleep has led to the free use of opium and chloral, which does more harm than good. If opium is to do good it is in small continued doses. Sleeplessness is a dangerous symptom in puerperal cases, and is the common forerunner of an attack of insanity. Maniacal patients may continue noisy and sleepless for many days and may exhaust their powers and sink; in melancholia the rest in bed, though without sleep, enables such patients to live for very long periods without any serious danger. I have known one woman who was never found asleep by the night watches for three months recover and keep well. In general paralysis sleep is often very sound, except in the earliest stages of hypochondriasis or excitement and the last stages of dementia. In ordinary dementia, again, sleep is generally good. In some cases of active automatic melancholy patients will repeat the same phrase, such as "I don't know what to do," for fourteen hours a day and sleep the rest as soundly as possible. In such cases the prognosis is bad. Sleep constantly disturbed by hallucinations is a bad symptom, but I have known a case that was nightly disturbed by fears of poison due to hallucinations of smell get well.

Changes in habits of life and of thought, if of some duration, are of evil omen. Many cases that are discharged relieved from asylums are quite unfitted for their places in the world by these changes. Persons who have been industrious become lazy and self-willed, and this is one of the fears of too long a residence in an asylum. Among these changes we notice purposeless lying and stealing. Many such cases become inmates of our gaols before the real cause of the malady is known. The stealing of trifles is common and

causes much trouble. We have one patient now who first showed his insanity by constant attempts at getting things from the "Exchange and Mart," and now he purloins tobacco and cigars if he have the chance. His case is all but hopeless; he was formerly a well-educated, high-minded youth. General paralysis, again, provides many thieves. Men who believe that everything in the world belongs to them can hardly be counted with the mere collectors and acquirers of trifles.

Among the psychical changes we see many religious ones. We have at present two men, one an Oxford man and the other the son of an English clergyman, who have both gone over to the Romish Church as a symptom of insanity, and are both most pronounced Jesuits. The Oxford man has had several similar attacks with similar versions, but now he has finally settled into a chronic religious maniac, constantly cursing us and even attacking us for "turning him aside." In another case a woman suddenly developed a high taste for ritual and neglected home for church, and has continued in the same unsatisfactory state. Of course, all acute maniacs have a change more or less marked in their nature, and when I say that such a change leads to a bad prognosis I refer to a change that is lasting and itself unchanging. One prolonged form of insanity, whether it be melancholia or mania, or one running into another, is bad. It is often supposed that, if a person has been melancholic for a year and then becomes maniacal, the prognosis is improved. I think not. Such cases as I have seen have either died or rapidly developed some chronic form of insanity. If the diseased process—and the process is similar though the expression is different—has gone on for a year or more the prognosis is very bad.

Next as to special hallucinations. I cannot say that I have seen any form of hallucination that is incurable.

Hallucinations of sight and hearing are common in many cases both of mania and melancholia, being in the former the active cause of many outbreaks of violence, and in the latter quietly ruining the nervous structure and building up some depressing delusion. When the hallucinations are almost constant by day and night the hope of cure is small. We have one case, a young, powerfully built medical man, of

good abilities, who for years was constantly tortured by hallucinations of hearing ; he was often noisy and violent, slamming doors and making other noises to drown the voices that worried him. His case is hopeless. Another medical man for a year or more has always carried his hand at his left ear to collect the messages that are sent to him. His case, too, is hopeless.

I find no special relationship between the side of the body most affected by these hallucinations and the form of disease or the prognosis. I should say in my experience that hallucinations are generally more marked on one side than another, and I have found rather more on the right side.

Hallucinations occur in cases of general paralysis, though perhaps not so commonly as in younger and more excitable cases. We had one general paralytic who not only had constant conversation with God, but said he felt the communications from the Deity throb through every fibre of his body. Hallucinations of sight and hearing are common with patients that are great masturbators.

Hallucinations of the other senses are less common, and, though I have had but few cases, I think they are as often cured as the other forms. We have lately had cases of hallucination of taste and smell, some cured and some not. Hallucinations of feeling, such as that galvanism is being used constantly, have usually proved intractable.

As to delusions I can only refer to a few. A common one is that the food is poisoned ; this I have mentioned as often occurring with phthisis ; it also occurs as a secondary symptom in some other forms of disease. Thus, lately we had a patient who was pregnant and suffering from the vomiting of early pregnancy. She translated this symptom into poisoning and refused food. It is very important, then, in cases with delusions that may be called false reflected impressions to seek the true cause and decide rather by that than from the delusion. In some cases we cannot trace any external cause for the delusion, and must form our prognosis from it alone. It seems as if we have a local brain representative of stomach, and that disease of this may set up delusions connected with the digestive apparatus. It is common to see patients refusing food because they fancy their bowels are stopped. We had in four

men at one time this year with this delusion. Of these one died after being bedridden for nearly a year; he lived on the minimum quantity of food, and vomited most of what he took; injections by the rectum caused collapse, and so we had to trust to what could be got in by spoonfuls. After death we could find no gastric lesions. One other is uncured and incurable; a blacksmith, aged fifty-three, married, and of sober habits. He had been in Guy's, and was treated for some peculiar muscular tremor that was seen in his extremities, especially after using them. He was dull and melancholy on admission and refused food; after some time I found he supposed his bowels to be occluded. He is no better after over fourteen months' treatment, nor is he likely to improve. The next case is rather similar except that he had had three attacks of rheumatic fever; his heart seems to be healthy. This man and the last had large abdomens. He fancied there was no passage through his bowels, and that "the food of six months was in his belly." No purgation could remove this idea. After about eleven months he began to be more shy about his delusion, and in another month he was rather excited, and we suspect that he is passing from a condition of melancholia to one of mania; in that case the issue of the case is doubtful. We have for the fourth case a lad of nineteen years who is much given to masturbation. In him we can find no trace of other physical disorder. His is, then, the most favorable case. Such delusions are, in my experience, more common among men than among women, and on the whole are unfavorable. Refusal to take food may depend on a great variety of delusions besides those above considered. Women refuse it for suicidal purposes or merely from an hysterical freak; others, both men and women, refuse it from religious delusions; thus, one man will not eat because he is a spirit, and another because "man must not live on bread alone."

In the next place religious delusions are common, but they are associated with such different conditions that I cannot say I know what is religious insanity. Cases are sometimes caused by morbid dwelling on certain religious ideas, but such cases may develop anything but a religious form of insanity. Thus, Thomas H—, æt. 56, was said to have been upset

by religious revivals, but on admission he was noisy, boisterous, and often blasphemous. He got well rapidly.

Are we, then, to consider only religious insanity that which has delusions taken from some system of religion? If so, we shall have a large class, including the prophets, priests, and kings, as well as martyrs and sinners, of an asylum. I cannot say, then, that religious delusions are more or less curable than any other form. Cases that think themselves eternally lost are unfavorable as a rule; the deep impression seems rapidly to fix itself and become ineradicable.

An unfavorable delusion is that the persons about the patient are not of the sex they pretend. In women we often see cases that assert the attendants are men in women's clothes or that the gardeners are women in men's clothes.

A somewhat similar delusion is that in which the patient mistakes persons; thus, one will claim every fresh person he sees as some old acquaintance. It has been said to occur very commonly in puerperal cases; this is true, but it also occurs in others. I have seen two sisters exhibit it, one who was suffering from puerperal insanity and the other from acute mania the cause of which was unknown. In this as in most of the other delusions one can only say that it has no definite value in prognosis, as some recover who exhibit it strongly and others do not.

Enough has already been said on this subject, and we must pass on to the suicidal and homicidal symptoms. The former are usually the more common and the more persistent. It is one of the most anxious questions that presents itself to us when to trust a suicidal patient. The suicidal cases differ much among themselves, and, of all, the impulsive cases are most to be dreaded. A patient was admitted into Bethlem having made two attempts on his life, one with a pistol and one by precipitation. He seemed to improve at once on admission, as many cases do improve after an unsuccessful attempt at suicide, and after careful watching was sent to our convalescent home for some weeks and behaved well there; he was discharged on leave, and within a week shot himself and died. Homicides are driven by the same power, but not so commonly. Suicides generally have a favorite method, and will prefer that to even more accessible means.

A man who has attempted to drown himself will pass by a railway train to seek a canal. Many cases are yearly discharged who were suicidal on admission for a time, but in these the suicidal symptoms have been of short duration, and often were not premeditated attempts but endeavours to escape from some real or supposed evil. The patients who are subject to recurrent impulsive attacks, that are sometimes associated with epilepsy and sometimes not, and the patients who quietly wait and bide their time as they brood over their miseries and wickednesses, are utterly untrustworthy. Such a person is Edward B—, who will play chess or bowls or racquets to throw one off his guard, be cheerful and pleasant for a time, and then secure a racquet ball and undo the string to make a rope to hang himself. Suicidal cases who are instigated to the act by hallucinations are never to be trusted, and the same may be said of homicides, though in homicides we see another face to this—not only may the patient be homicidal from voices telling him to murder some one, but he may be so tortured by subjective sensations that he murders the supposed cause of these.

7. Having now examined the various symptoms and their relative importance, we pass on to consider the assemblage of these symptoms as seen in the *forms of insanity*, taking first hysteria, and spending some time in a rather detailed examination of this state, as it is the one on the borderland that is most constantly seen in general practice, and one that constantly requires the important decision of home or asylum treatment.

I suppose hysteria is too common in the women of civilised countries to allow one to lay much claim to it as a special neurosis. But the hysterical condition is one of extreme mobility in the nervous system, and exhibits itself under so many forms that are related to insanity that we must take some trouble in its investigation. In the first place it is very common in the offspring of parents who have suffered from nervous diseases; I am not in a position to say how much more common it is among such persons than among ordinary women. It is common too in persons who sooner or later become insane, and in taking carefully the history of the admissions into Bethlem I find a very

large number have suffered from marked and severe hysteria before admission. We have had cases that have first been under treatment at a general hospital for paraplegia, and have later developed unmistakable insanity. Some patients have attacks of hysteria at puberty and then pass on in fair health till a first parturition, over-lactation, or some moral shock upsets their nervous balance; others in the intervals of recurrent attacks of insanity are subject to hysteria.

We shall also have to notice cases of hysterical insanity, and here I find a difficulty, for there is no border line between insanity and hysteria, or else we should not have these cases to consider, for cases of hysteria in which the emotional side of the person is at fault would hardly come under our notice in asylums. But what are we to call cases that have for a time a loss of control, who know that shouting and rushing about are unladylike and improper, and yet give way to such conduct—cases that if you can get a proper command over them can behave, and if judiciously treated rapidly get well? We have many such cases associated with irregular menstruation or with the early onset of the catamenia. These cases, as we shall see, exhibit every variety of mental symptoms. One will refuse to move without crutches, another will insist on being fed; one will remain always like a well-dressed doll, expecting to be noticed but occupying herself in nothing but self-complacent introspection; one case will eat rubbish, and another will read with the book upside down. Many such cases find their way into asylums by a sad misfortune, I think, for they are often so plastic and will-less that they gradually get fitted into notches from which it is impossible to move them. They suit themselves to their surroundings, and any attempt to force them back to the outer world is followed by an explosion that frightens friends and causes the patient's return. It is not my intention to dwell on the treatment of such cases, though I feel strongly that a general hospital is to be preferred to an asylum. It is difficult to fully explain the nature of these cases, for it will not do to say that they know they are doing wrong or foolish things and yet do them, for not only do many acute maniacs know what they are doing, but the great majority of sane people act as injudiciously in the most important actions of

their lives. Yet the persistence of acting in a childish way is very characteristic of these cases; their general health, too, is good, or rapidly improves under regular care, and yet often with this bodily improvement there is no real mental gain. One variety of this hysterical mania is rather of an explosive nature; a girl rushes about, is rather fanciful than untidy in her dress and hair-dressing, is given to writing love-letters. Such cases may be often controlled by neglecting them as much and as judiciously as possible.

I have seen a girl who was always excited and noisy, using very strong language when she saw the doctors, but by always putting her by herself and not allowing her to speak to them she gave up her noise and rapidly improved, though on the first few visits from the doctors she had to exercise great self-control to keep herself from being noisy and rude again. This case was interesting from the extreme degree of irregularity in her capillary circulation; one hour she would be quite pallid and the next hour crimson as possible. This patient is now well.

Under this general head of hysteria I shall consider cases of sudden cures, many of which, I am sure, are the terminations of hysteria rather than of insanity. Dr. W. Rhys Williams¹ read a report before the Psychological Society of some cases that occurred in Bethlem in 1874, and I am indebted to these cases for some very important facts. We see cases of various kinds get well instantly, and it is hard to understand the sudden restoration of the balance. Most of these cases, as far as my experience goes, occur in women; I have only seen one distinct one in a man. Some of the sudden cures are not so easily explained. I have seen a person who had a delusion that she had the itch and refused to shake hands with any one; she went to bed in this delusion and awoke quite free from it and full of wonder at her own fancies. Other patients have gone to bed believing themselves eternally lost, and have awakened full of hope and faith. These may not be considered sudden enough, but we shall have to mention a case in which the patient in a moment awoke from her long dream and was well. Such cases are so similar to the paralytic cases that get up and

¹ 'Journal of Mental Science,' April, 1875, p. 151.

walk after a prayer, or to escape from a danger, that I class them together. It has been said that a kind of touchstone for hysteria is that in such cases there is no tendency to mental weakening, and that just as an hysterical girl will lie speechless and paralysed for years, and yet not lose power of speech or have any joint ankylosis, so a woman who has neither dressed nor fed herself for a year will in a minute be well enough to notice the most minute change in her attendants. As far as my experience goes there is no mental weakening in simple hysteria, but there is always the danger that the hysteria is but the first stage, and that the patient may have an attack of insanity following a longer or shorter interval. And some of the cases of so-called hysterical insanity do end in death or dementia. Thus, we had one girl who at eighteen was admitted suffering from a noisy, boisterous mania; she knew all she was doing, and would at times control herself. She was soon cured, but next year returned profoundly melancholic, and died of phthisis. As to cure in hysterical cases, the explosive cases generally get well, but are very subject to relapses, and these relapses are very dependent on menstrual irregularity. The frequency of an inherited taint makes the case less hopeful, and marriage is a very dangerous remedy to recommend. A well-marked example of the above statements is C. M—, who at seventeen was first admitted into Bethlem. At first she was rather depressed, but soon became noisy and amorous, always wanting to flirt in an affected way. She had a great idea of her powers of fascination. Her mother was insane. She rapidly got well, but soon made Bethlem quite a home. For some time she held to a delusion that she was married. She was discharged well after fifteen months' residence. This patient kept well for four years, when she was again admitted after the birth of her first child. Her symptoms were similar to those in the first attack, and again she is well; but I fear if she continue to have children she will be subject to constant relapses, and that if she separated from her husband we should have no better result.

Another most instructive case has already been hinted at, and I think it worth fuller notice. C. F— æt, in 1874, 23 years, was admitted into Bethlem in 1870. She was in Charing

Cross Hospital four years ago for hysterical paralysis; she refused food, imagined she had committed great crimes, &c. She has had distinct hysterical fits and used to grow rigid when touched. Her mother was rather weak-minded, but not insane.

Each attack of insanity was associated with amenorrhœa. Her first attack was so slight that she was not sent to an asylum. In her second she was six months in Bethlem, first desponding, then noisy and troublesome, and then rapidly recovering. Her third attack occurred after a love affair, in which she discarded her lover. Up to this time for three years she had been quite well and followed her employment as a barmaid. This attack was similar in character to the others, and she was discharged cured in six weeks and followed the employment of a needlewoman till thirteen months later, when she again broke down and was in Bethlem, suffering as before, only that this time she was more excited and violent, and the symptoms lasted for six months before she was well. I may remark that the prognosis is better after a longer stay in the asylum than after a very short one in these cases. It seems as if we have to counteract a morbid habit, and therefore must not be too hurried in our discharges. I am sure that under the present more careful superintendence of cases we get more cures than formerly, but I believe too that we get more relapses. In the above case, after six weeks' residence in Bethlem in the third attack, the patient had a chance of following a new mode of life, and as she was well at the time we trusted her, but she lasted a shorter time than we had a right to expect in one so young. We do sometimes cure such cases and find that they have lived for years without any relapse, but I cannot point out any certain guide to help one to say that this case will relapse and that one will not. I believe that directly inherited tendency is the most dangerous; this is increased if the other parent suffered from any chronic constitutional disease; the danger is also increased by the marriage of blood relations.

The next case I add is in many respects similar to the last, but has had no relapse, though she has left the hospital for nine years. J. D—, æt. 20, teacher, admitted in May, 1865. No family taint; she was a well-made, rather pretty girl, musical and pleasant; menstruation irregular. For two years

she had been subject to cataleptic fits; she had delusions about marriage, was very erotic, and was at times most obscene in action and language. All kinds of medicines were tried, from *Mist. Ferri Co.* to *Potassii Bromidum*, but were of little use. She gradually improved, and though of an amorous disposition she got fair self-control, was discharged well in September, 1867, and has remained well, still following her occupation as a governess. She has married and has a family.

If after some months of treatment and watching these hysterical cases slowly improve in appearance, getting a clearer complexion and less flabby condition, at the same time acknowledging the troubles they have caused and making amends by their industry and handiness, one thinks better of them, and many last for years and some may last for life if no special strain is thrown on them. Unfortunately we cannot temper the strain to the strength of each human link, and so we have many more accidents than we could hope.

Another most typical case of this kind, in whom we have more hope, was G. S—, a girl of 19 years, fair and good looking. She was admitted in November, 1870. No hereditary taint, and a first attack. She exhibited the restlessness, the tendency to dwell on love and marriage, and also the habit of lying, so common in these cases. It was also remarkable to see the variations in her capillary circulation. She slowly improved and got well, and has followed her occupation as a governess ever since. She is still single and has therefore avoided the puerperal dangers.

These cases that are considered as hysterical from the age of the patients and variability of the symptoms are common. Thus, each year six or seven per cent. of our female admissions are of this class. The percentage of cures is high in these cases, but it must not be supposed that all get well. As is generally admitted, youth is an advantage if the patient be fully matured, but diseases of the nervous system coming on before puberty have a great tendency to produce mental weakening. Though hysterical patients do not become demented they may become chronic cases. We have the cases of Polly A— and E. J—. The former was admitted into Bethlem in 1871, æt. 15; she was a school girl and menstruation had begun. She was quite unmanageable at home and in this hospital spent

most of her time in admiring herself or else mooning alone and unoccupied. She was tidy and clean, indolent, vain and passionate, able to do anything from dancing to reading, but rarely able to exert herself to begin any of these things. She was in good general health, the only trouble being excess of menstruation at times. She was always worse at these periods. All kinds of moral treatment were used. She was galvanized, had shower baths, and was tried on leave, but all in vain ; we could never do more than raise her out of her silly self-complacency for a minute or two. For four years she was kept here, hoping that completed puberty might cause a change, but no change came, and we must say that we saw but very faint chance for any improvement. Still, in all the four years she had not become in any way weak minded. Other cases we have seen of spoilt children without any more distinct hereditary neurosis than the tendency of a silly mother to spoil her child. One such case had developed in very early years a literary genius that was thought highly of by the late Charles Dickens ; but whether the precocity was the result of disease or whether undue attention and praise disturbed the mental balance I cannot say—I rather believe in the former. Of 120 patients admitted during this year, whose friends were especially asked about hysteria, I find that 23 had had distinct hysterical fits. This does not seem a very large proportion, but I find they are all young cases, the hysterical history being lost in older persons. Before leaving hysteria I would again speak of sudden cures. These are more common among women than men ; they are more common at early puberty and at the climacteric. I have not yet met with any case that has on two occasions suddenly recovered her sanity, though I have seen one lady who recovered suddenly from aphonia and on another occasion from right-arm paralysis. Miss E. C—, admitted 1873, æt. 42, governess ; no hereditary taint ; overwork given as the cause ; in weak health ; gradually became more and more depressed, refused food, and took no notice of any one. She became bent almost double, and her hair turned very grey. A year after admission, at dinner time, just before the anticipated visit of the Bishop of Winchester, she suddenly said she was well ; she has remained so and follows her employment. Other similar cases are given by

Dr. W. Rhys Williams in the 'Journal of Mental Science' for April, 1875, p. 151.

Melancholia is the next form of disease that we have to consider. In my experience cases of melancholia are slightly less curable than cases of mania. Under melancholia I class cases of simple melancholia, of hypochondriacal melancholia, of active and passive melancholia, of melancholia with stupor, and certain cases of delusional insanity in which there is general mental depression. In this as in other forms of mental disease the general conditions elsewhere considered form the groundwork for prognosis. Strong hereditary taint is against a permanent cure. I have seen a similar form of melancholy appear in several members of the same family. We have had three sisters in Bethlem who suffered from similar attacks of profound melancholy.

In melancholia the younger cases recover more rapidly and in larger proportion than the older ones. But my opinion is that the duration of the attack is of the most importance. Early cases are very hopeful, even though the patient be past middle life.

As to the respective curability of the varieties of melancholia, simple and passive melancholia are more curable than the more profound and the delusional forms. As to active cases, that are always wringing their hands and pulling out their hair, who are restless, sleepless, and appear to be in ill health, I think badly of them unless very young and brought early under treatment. Thus the following case :

Alice B—, æt. 24, single. Paternal grandfather drunken and paternal aunt now in an asylum; has been nervous and hysterical for years, but not melancholy till a few days before admission; menstruation irregular and scanty; cause of present attack unknown. On admission thin, worn and anxious, sleepless and restless, constantly walking about wringing her hands and saying she is "not a proper sort of girl," that she "has no flesh or bones." She continued in this miserable state for nearly four months, the continuous current being tried in vain. She gradually improved and left the hospital after twelve months' treatment in robust health, mentally bright and cheerful, with menstruation re-established; and she has

continued in perfect health since (1874). There is great probability of future attacks if her general health fail.

I cannot recall a single case of melancholy with stupor during the past three years that has recovered, and we have had eight or ten well-marked instances. These have been more common on the female side, and after from twelve months' to two years' treatment have been discharged uncured. In these cases we often had suppression of menstruation and in several have kept the patients longer than the ordinary year under treatment to try all possible methods of re-establishing the menses. But neither tonics, nor ergot, nor hellebore, did any good.

Those cases of melancholia that die generally sink from some secondary disease. Now and then they are simply worn out with want of sleep and want of power to assimilate food, for some cases that refuse food, though fed liberally several times a day by the tube, yet get weaker and lose flesh. We have one lad at present under treatment who has been fed by the tube or funnel twice daily with strong beef tea, eggs, cod-liver oil, and a full supply of milk, yet this patient has slowly lost flesh and will most probably succumb to pneumonia or some catarrh. Fewer cases of melancholia die rapidly from exhaustion than cases of mania.

Most of the uncured cases settle down into dementia and a few into a chronic active melancholy, a kind of automatic misery; thus, one case in at present:

Admitted May, 1873, single, aged 53, for the first attack, the cause being unknown. After being simply melancholy for some months she passed into an active state, and for the last two years has never ceased during twelve or fourteen hours a day wringing her hands and saying "I don't know what to do." She sleeps well and takes food fairly, yet she is losing flesh. This patient will slowly wear herself out.

There are certain other uncured cases that settle into recurrent melancholia. Such patients may keep well for a year or more and then become melancholy for a few months, again to get well. On our incurable establishment we have many such

cases that are for most of the year pleasant and sociable, but the attacks recur and, as a rule, get longer and longer till they end in dementia. It may be very many years and after numerous attacks that dementia results, and some chronic cases live their lives out subject to fits of depression recurring at longer or shorter intervals.

A few cases of acute mania die every year in Bethlem of exhaustion following the acute stage. In such cases we get a few degrees' increase of temperature and more distinct signs of active change in the brain tissue; such cases are probably allied to cerebritis or to inflammation of the membranes.

Acute mania of the noisy boisterous kind is generally cured, the prognosis being influenced by the conditions already stated.

We have had during the past year several cases that for a long time showed no signs of improvement, but were so similar in character that they are noteworthy. In these cases young or middle-aged men were constantly talking in the most incoherent way, yet with a manner indicating that they imagined they were talking sense. They never ceased to pour out a jumble of words, lost flesh, and acquired a sallow complexion; nevertheless, after six months of this constant jabbering they became quiet, and eventually got fat and well.

The uncured cases pass into chronic mania or dementia. The conditions included under chronic mania are very various, and we see many cases that have established a new mental life on a basis different from ours. Such cases may fill various positions of life usefully and not require asylum treatment. I have seen one case of a housekeeper in a large house in London who had several slight attacks, so slight that her master, though a doctor, did not recognise their true nature. When I was called to see her she was a chronic maniac, but still continued an useful servant, mechanically exact and painstaking. We have such cases as our drudges in all asylums. One man will clean windows all day long and another polish brasswork, and each tells you he is about his "Father's business." We had one lady who had changed the notions of right and wrong into mathematical figures associated with colours, and thus would consider perfect truth as a white square, truth

as a white upwright, and evil as a black or red circle. All I would wish to impress is that many of such cases may be managed at home if there be some one who can see that they are not ill-treated. The danger is to the lunatic, and not to his friends.

From acute primary dementia we get a few cures annually, but to be cured the cases must be seen early and be young, without any history of previous attacks or local injuries, such as sunstroke; those that have been most satisfactory have been caused by fright or sudden shock. In one we had a family history of insanity, yet he got well and has remained so for two years.

The form of dementia following acute diseases and pregnancy is fairly curable, and what I would most insist upon is that such cases may not change for a year or even two and yet get well, an advance in general health preceding often by some time improvement in the mental condition.

In general paralysis I have never seen a cure. I have seen a good many cases discharged as cured—so well that one could detect no mental symptoms that required their detention in an asylum. But some tremulousness of the tongue or facial muscles, irregularity of pupils, loss of memory or a mental buoyancy beyond the healthy standard, showed that the disease was only masked, not cured. The only difficulty that arises is from cases of drunkenness. The symptoms from drink and from general paralysis are alike, and now and again we give a bad prognosis and then discover the true history of the case. It must be remembered, however, that drink also produces cases of general paralysis, and I have seen a man, discharged well from a disease that was thought to be due to drink, readmitted suffering from true general paralysis.

Some cases of general paralysis lose all their mental excitement and yet die of paralysis. It is not necessary to keep such cases in asylums, it is merely a question of nursing. In the prognosis of general paralysis it is usual to say the patients are sure to die within three years. As a rule this is true. I believe we shall find that there are many varieties included in general paralysis which as yet we have no means of distinguishing. I always think the stout, well-nourished patients run a greater chance of dying in a rapid succession of fits. As a rule

a general paralytic lives as long as he eats, unless he chokes himself or gets pneumonia. When the appetite fails the end is not far off. There is no mental improvement before death. Bed-sores and trouble about the bladder are two very serious complications. In cases produced by drink fatty degeneration of the vessels or of the heart may accelerate death. Thus, a patient with a fatty heart may have a fit, which may be just enough shock to cause the heart's action to cease, so that one suffering from early general paralysis may die suddenly of heart disease.

Delusional insanity and insanity associated with moral perversion are both unsatisfactory. They constitute classes too large for one to be able to say anything more definite about them. We have considered already some forms of hallucinations, and pointed out that cures may occur in cases that suffer from hallucinations, the great point being early treatment and, if possible, diagnosis as to the seat of the irritation, whether it be in the sense organ itself or in its deep nervous origin or connections.

Moral insanity is a symptom in many forms of disease. The hysterically maniacal are very much given to lying and stealing, and many chronic lunatics get a mechanical way of filching and hoarding without making use of their treasures. Kleptomaniacs, or patients who, from an insane impulse, are always stealing, are generally incurable, but I have seen several cases that on admission were most constant and adroit thieves become honest and trustworthy under treatment. The best-marked case was that of Maria S—, single, a French woman, æt. 26. The cause of her insanity was given as sunstroke; this is more than doubtful. She was at first very melancholy, said she was "the devil" and was "dirty and wicked." Some months after admission we found that she had been stealing clothes and other things in the most clever way, taking out the names of other patients and putting in her own. She was removed to a less select gallery and felt her punishment, but still continued to steal. She said she struggled against the habit; she gradually improved in general health, was less melancholy, and gave up her thieving ways. She was discharged well after two years in the asylum, now nearly two years ago, and we have heard of no relapse.

All forms of insanity in which loss of memory is marked are unsatisfactory—not the mere confusion and mixing up of times and places, but where the patients, after an effort of thought to recall the date or place or length of detention, fail. Of the same kind is the want of appreciation of the age of the patient's companions—when a man claims as his son a person as old as himself. Such loss of memory is frequent in senile changes, in general paralysis, and after injuries to the head.

Periodical attacks and recurrent attacks are very unsatisfactory and may be looked upon as indicating more or less marked cases of "*folie circulaire*." The great difficulty is to say which cases will pass into chronic weak-mindedness and which will merely keep to the vicious circle. Some cases, and they are the least manageable, will go on year after year, having as many as four or five attacks of most violent mania lasting a month at a time, and yet in the intervals the patient may be quite sane and free from signs of mental weakness. The tendency of recurring attacks is to mental weakness, but the general health may be good and the patient may live to extreme old age.

I have already discussed the conditions of the insanity in pregnancy and the puerperal state in 'Guy's Hospital Reports,' 1875, and shall only give a slight résumé here. Insanity of whatever form that comes on in the earlier months of pregnancy generally gets well of itself at quickening or soon after, and rarely extends to the eighth month. Insanity commencing during the later months of pregnancy is rarely relieved by delivery, and even then the relief is usually but temporary. This form has all the characters of the insanity after delivery, in which it results. Insanity appearing for the first time during labour generally passes into insanity of childbirth and its cure is tedious. As a rule, if it comes on soon after delivery, the symptoms are maniacal; if some weeks after, they are more often melancholic.

Physical improvement is common before mental. The patient often passes from a stage of depression, through one of excitement into one of partial dementia before recovery. This partial dementia is very characteristic of puerperal cases. Grief, shocks, severe labours, exhausting loss of blood, rapid child-

bearing, all have a tendency to produce puerperal insanity, but here again I look upon hereditary tendency as the greatest predisposing cause.

The insanity of over-lactation is due to exhaustion, and is more commonly melancholic; it is tedious and requires care in the re-establishment of the general health first. I look upon this as rather less favorable than the insanity of the pregnant and puerperal states. In many cases the earlier symptoms are slight and continue long before it is considered necessary to seclude the patient, valuable time being thus lost.

The climacteric period is not without influence on the course of the symptoms; thus, in some cases of recurrent insanity no further attacks occur—this is rare; in other cases the climacteric changes the character of the attack or precipitates the end. Certain cases of puerperal insanity have repeated attacks till the climacteric and then pass into a state of dementia. The climacteric is associated not infrequently with a tendency to drink, which is of evil import, while in other cases delusions of a very strong sexual nature are developed. Delusions of depression and true melancholia are the most common at this period. Those cases that have their first attack of insanity at the climacteric, whatever the form of the disease, are unfavorable, but cases that recover from this their first attack seem to be tolerably free from remissions.

Among the most rapid and the most unsatisfactory cases of cures that we have are those cases in which drink has played the chief part. If the patients have long been steady toppers we often get a variety of paralysis that must still be placed with general paralysis; on the other hand, if they are physically curable they are morally beyond our power. I hoped against hope that asylum discipline, in which there is a liberality of diet and a moderate allowance of stimulants, would prove to be better than total abstinence, but I find that abstinence and moderation are equally unsatisfactory.

A distinction must, however, be made between those persons who have by indulgence become too weak-minded to resist the temptation and those that only drink when an insane fit is on them. The latter are just as curable as sufferers from any

other form of insanity, but from some probably physical cause they are led to drink. These cases are interesting as a kind of connecting link between the habitual drunkard and the lunatic. During the past year we had two very good examples of drinking in insanity.

The first was that of Emily S —, æt. 32 ; no hereditary taint ; mother of nine children, which were born rapidly. She began to suffer after lactation of the last child, and nine months after its birth began to take too much stimulants ; this habit continued and she had to be sent to Bethlem, where she was rapidly cured. On her return she found her home broken up and her husband charged with felony ; upset by this shock she at once took to drink, again became a patient here, and was again discharged well.

In contrast with this is the next case, a patient of thirty-seven, with two children ; she has insane inheritance on her mother's side and has already had two attacks of insanity, the former attacks being produced by puerperal conditions and grief. In the present attack she rapidly recovered, but on her return home found things not quite to her liking and also her husband rather too fond of stimulants ; she had a relapse, in which she took furiously to drinking. She got well, but I fear her future attacks will most probably be associated with a tendency to drink.

The prognosis of drinking cases is bad, as we said before, and so much the worse, the more distinctly the vice can be traced to inherited neuroses ; thus, the offspring of a father or mother who has been insane or has only suffered from some nervous disorder like paralysis agitans, is all but hopeless if he takes to drink, unless he should have attacks of insanity, at which times alone he drinks. The distinction may not seem great, but is important. There is rarely any danger to life, but yearly we have cases that succumb ; this is the more common in those that refuse their food and in those that become general paralytics.

It seems to be a suitable place to introduce the consideration of cures in cases that owe their origin distinctly to physical

causes. Throughout this as throughout the other classes we must admit the influence of heredity as the most potent. It is not every person that will become insane even with the same struggle and worry, and we come across interesting cases that distinctly owe their insanity to other physical disorders, such as phthisis, pneumonia, fever, syphilis, &c. In some of these the prognosis is very good; cases get well rapidly, and we may say of them that they are likely to remain free from insanity. I have seen one case that had an attack of insanity after cholera, for which he was treated in Bethlem twenty-five years ago, and though he has led an active anxious life he has had no return of insanity; the tendency, however, has been transmitted to one of his children begotten since the attack.

More and more is one forced to see the great importance of studying the general condition of the patient apart from the mental symptoms, and therefore I prefer to lay more stress on this than on the form of insanity. It is much more easy and certain to give the prognosis of a case when you are sure it depends on some condition of anæmia than by simply looking on it as a case of mania. Many of our young cases come in suffering from uterine irritation, with absence, irregularity, or profusion of menses, and are relieved by the cure of these disorders, such cases being, as we have already said, still liable to a return of their mental trouble when the sexual functions are again over-exerted.

The prognosis in cases depending on uterine irregularity is not easy, for in so many cases the same cause that produces insanity produces amenorrhœa. As a rule we in asylums are too timid or too ignorant to examine the state of the uterus; we dread the results of examination on persons who are already morbidly sensitive, and so many cases grow into fixed delusions before anything is done for their relief. It is not every case found in an asylum with uterine disease that owes the insanity to this; thus, we had last year Miss H—, single, æt. 47, governess, no hereditary taint, with delusions that she had been changed at birth. She rapidly improved; she had had pecuniary troubles, and had just passed the climacteric, but during her stay with us these causes of worry were removed, and though she had an immense fibroid of her uterus she left in perfect general health and quite sane: indeed, I think the

fibroid may kill her without her having any further mental symptoms. Some of the most chronic and incurable of our cases have some uterine disturbance. One lady imagines that she is raped nightly and fancies that she has syphilis, or that her clothes, boots and pillows are drugged by us; she has a constant leucorrhœa, the cause of which she will not let us investigate. This form of delusion is more common in the single or widowed than in the married, and as a rule is very difficult to remove. The cases are similar to those of suspicion already noticed. Cases are on record in which women have been only sane when pregnant, and this is supposed to be due to a malposition of the uterus which was rectified by pregnancy. Mechanical treatment in such cases ought to be of service.

In phthisis the prognosis is often said to vary inversely with the disease; that is, that mental symptoms get better as the disease progresses. This is sometimes true, but by no means constantly so. One case that struck me much was a young engineer who went for lung disease to South Africa and was greatly improved, but broke down mentally and had to be sent back to England. Here he became for a time better in mind, but his phthisis progressed. He varied for some time, being better mentally when his cough was worse, but towards his end no mental improvement was observed. He was suspicious of poison. I have seen one or two phthisical cases become sane shortly before death.

Among the most important physical complications we have to deal with is syphilis. In many cases the prognosis is rather that of the syphilis than that of the mental symptoms. For myself, I know no syphilitic insanity, and I know no pathological changes of which I can say, "These are changes in the nerve-tissues due to this disease and found in none other." One is quite used to syphilitic tumours stifling mental action by compression or causing undue excitement by irritating the centres. Again, one knows that changes are common in the arteries of syphilitic subjects, and these changes may cause starvation of the brain or parts of it, but I have failed to find any diffuse change in the nerve-tissue.

Probably the most common form of insanity associated with

syphilis is epilepsy. In these cases we have marked local paralyses, nocturnal headaches, gummata, and a history of some constitutional symptoms, often slight. If seen and recognised early this may be cured, and the fits may have been too few or too slight to leave any permanent effects. If the fits have persisted for many months there is but small chance of ultimate recovery.

It is generally thought that if there is evidence of a well-formed gumma there is but slight chance of any real improvement; my experience does not bear this out, as will be seen in two cases given below. I think the influence of syphilis in the production of cachexia is not sufficiently considered. I shall have to narrate a case in which acute mania was followed by mental improvement up to a certain point, but here recovery was arrested until I discovered evidence of syphilis in an ulcerated throat and a gumma of the tongue. I then treated the syphilis: the general health and mental soundness were both re-established; and though trouble and worry have pursued the patient since he left, he battles on and has had no relapse. This is not a solitary case. I have seen two others in which the recovery was arrested till the syphilis was treated. I fear we must conclude that most cases that have extensive paralysis of some cranial nerves associated with mental symptoms are unfavorable, and that the majority pass either into epileptic insanity and dementia, or into the latter directly.

Syphilis; acute mania; recovery.—H. E. N.—, æt. 31, widow. One child living aged ten years; since the birth of the first child has frequently miscarried, and has never born a viable child. Has had a coppery rash over her body and a chronic ulceration of the throat; has had no fits and no serious injuries. Before admission she was noisy and incoherent, violent and destructive. On admission she had to be put in strong clothing, but soon became more silly than violent, and would lie on the floor for hours together, untidy and unoccupied. Towards night she complained bitterly of the pains in her head, and became maniacal. Within a month from admission she had slight ptosis and some external squint on the right side; the former increased for some time, notwithstanding the

use of Ammonii Iodidum in ten-grain doses three times daily. The iodide relieved the nocturnal headache rapidly, and the patient became more rational. The dose was increased to twenty grains, but the ptosis was very obstinate, and about three months after her first admission, though well mentally, the ptosis was complete. In another month I found that in the dark the patient could open both lids together, but in the light the right still drooped a little. After five months' treatment she was discharged well, with, however, a slight trace of ptosis.

Syphilis with dementia; recovery.—H. P—, æt. 31, married, contracted syphilis six years ago. Had slight sore throat and eruption on his skin. Has now a hard syphilitic enlargement of his testicle. There is no known taint of insanity in his family. He is well built though short, and his physical health has been good. He has had no moral cause to produce his mental disturbance. For some time he had been sleepless, and the appetite had been failing. The onset of his symptoms was sudden. He became noisy and incoherent, calling himself one of the "Trinity." On admission he rapidly passed into a quiet state. He would sit for hours with a vacant smile on his face, doing nothing. One testicle was found large, hard, and uniform. At first the case was considered to be one of general paralysis, and he was treated—with no benefit—with physostigma. There was slight ptosis on admission, but this did not increase for some months. His wife said he always had a slight drooping of the lid, and on examination of photographs I found this had been the case for two years at least. The ptosis rapidly increased, though the iodide of ammonium had been given regularly in increasing doses. On examining his optic disc I could find no proof of neuritis; the vessels were a little full and numerous, and the fovea was rather deep, large, and white. The dilatation of the right pupil by atropine was extreme, and for some weeks it never resumed its natural size. At the same time external strabismus became developed and more and more marked. The mental symptoms increased, the patient became more demented and dirty in his habits, and the worst prognosis was given; he was losing flesh rapidly. We

persevered with the iodide for about three months, and then the patient refused to take any more, closing his teeth firmly and struggling if any attempt was made to give him anything like medicine. About six weeks after the omission of medicine he began to improve, and for six months steadily progressed in all respects, losing the ptosis and to some extent the external strabismus, while the tumour of the testicle also became smaller. He was sent to our convalescent home, and rapidly gaining mental and physical power, was discharged cured after seven months' residence in the hospital.

Acute mania; recovery retarded by syphilis.—J. E. F—, æt. 22, single, artist, related to noted artists, and of a nervous family. On admission the patient was most acutely maniacal, violent, dangerous, and destructive. The cause of his insanity was said to be disappointment and overwork. He had had disappointments, and had also had some pressure of work to get ready something for the Academy. There was a history of a slighter attack of melancholy a year before. At times he was noisy at night. He was maniacal for three months, associating with the worst patients, attacking the officers and decorating himself with feathers and rubbish. After an unusually violent outbreak he became calmer, and improved up to a certain point. He was sent to our convalescent home, and returned quiet and indolent, quite changed in character and habit. He was now melancholy and inclined to wander. He no longer took any interest in painting. Four months after his final outbreak of violence I discovered that he had had syphilis, and found he was suffering from ulcerated throat and a gumma in his tongue. Potassic iodide in ten-grain doses rapidly healed his throat, and he began at the same time to improve in mind; in three months more he was discharged cured, and has remained so ever since, now nearly three years. I do not consider his case so hopeful as the others. He comes of a neurotic stock, and any other cause may again kindle the fire in him. Syphilis was not even presumed to be the cause in his case, but only a condition preventing his recovery.

I shall now proceed to examine rapidly some of the cases of

relapses and readmissions. We make it a rule at Bethlem to receive all who having once been patients there have been cured with the least necessary trouble, and therefore we have favorable opportunities of seeing the relapses. To make the investigation more complete I have collected together the admissions of 1873, 1874, and 1875, up to September. During that time 600 patients were admitted, of whom 248 were males and 352 females.

I subjoin a table showing the number of the attacks in these cases :

		Males.		Females.
1st attack	. . . . .	196	...	255
2nd "	. . . . .	36	...	56
3rd "	. . . . .	10	...	21
4th "	. . . . .	8	...	10
Many previous attacks	. . . . .	3	...	10
		<hr/> 248		<hr/> 352

Thus we see, that of 600 admissions 149 had had attacks before, and may be looked upon as cases that had been discharged cured by us or by other asylum physicians. This is 24·8 per cent. on all admissions, and must be considered high enough to warrant the dread of return in cured cases.

Some of these cases were discharged from other asylums, but I shall particularly notice only such cases as have been under treatment in Bethlem more than once, because the change in character and moral nature that is sometimes the only thing left by an attack of insanity is more easily recognised by those who have seen the case from the first ; for many cases that seem merely odd to one not accustomed to them, present to the physician who has seen them throughout a perversion that he knows is associated with deep-seated mischief. It is often not till the patient has been under treatment for a second attack of insanity that a decisive prognosis can be given. Many cases rapidly improve in an asylum ; the regular habits and freedom from annoyance by watching and restraint act beneficially, and after a short time the patient is sent on leave : she manages to control herself for some time, but disappoints us by relapsing again soon after her final dis-

charge. I speak of these cases as females, as they occur most commonly among women. Such a relapse generally means that the patient is incapable of suiting herself to the variable surroundings of the outer world, and is only fit for the microcosm of an asylum. Others reappear for a second time after a long interval, and we find a similar cause has produced a somewhat like result. A young man of twenty-one is worried at his addresses being rejected, and becomes melancholy and suicidal. He recovers, is successful in his next matrimonial enterprise, and keeps well for years; money troubles come on him, again he falls and is brought to us, again to recover. In others the second attack is really but a continuation of the first;—thus, many general paralytics for a time rally; the stream of disease is for a time lost to sight, but yet it flows on, as we see by its increased force when it does reappear and the deep marks it has left of its progress. And we shall have also to see and recognise cases that repeat themselves, patients who are of an essentially neurotic type, those whose illnesses are nearly always neuroses; they have come into the world predisposed to nervous diseases, and are always falling out of the ranks from them. Thus, we have cases that have been in Bethlem ten or twelve times in twenty years. Many of them have exactly similar attacks at each recurrence; or the attacks differ only in duration. They have a special nervous weakness that is made manifest whenever they are reduced in their general health.

From what I have written it will be seen that at best there is much doubt about the prognosis after the first attack, but yet we shall find that some cases are more likely to keep well than others.

Of the 149 relapses during the past three years I shall confine myself to 124, as I have certain knowledge of these. I find that 47 were males and 77 females. I may remark that from the difference in the forms of insanity, those who never recover from their first attack are more frequently men, while women often have recurrent attacks and are more free from general paralysis. Among the 77 women, 16 owed their attacks to puerperal conditions, that is, about 20 per cent., whereas 14·7 per cent. is the ordinary proportion of

puerperal cases to female admissions. Of the rest, 42 were cases of mania, 16 of melancholia, 1 of general paralysis, and 2 of dementia. Among the males we had 47 relapses, thus made up—mania 25 cases, melancholia 18, general paralysis 2, acute dementia 2.

From this it will be seen that the excess among the females is almost accounted for by puerperal cases. My statistics scarcely make strong enough the point of relieved cases of general paralysis, for many cases that require an asylum during the earliest symptoms become docile and tractable as the disease progresses, so that the friends keep them to die at home. Every year we have some cases of undoubted general paralysis that we discharge mentally well, though we know that it only requires time or some extra worry to cause a fresh exhibition of the symptoms.

From the above figures it would seem that among the women the relapsing cases are far more commonly maniacal than among the men. We have a large series of acute young cases that reappear time after time to be cured. What their end may be I know not, but I expect they will become chronic maniacs.

Cases of melancholia rarely run such a rapid and acute course as the above, and seem to have longer intervals of health, unless they are utterly hopeless. Among the women we have less difference between the numbers of the cases of mania and melancholia. But as among the women we have an excess of puerperal cases, so among the men we have an excess of hypochondriacal cases, which are very subject to relapses, failing of the general health being enough to produce hypochondriasis in such persons. It is not unfrequent for patients to come in suffering from mania in one attack, and melancholia in the next. Many instances occur of similar symptoms appearing with each succeeding relapse. It is strange to see the same patient come in every few years believing he has no mouth and no bowels, and to know he will gradually find both; or to see a man haunted and followed by his enemies, and to know that in time he will again be self-confident.

Certain forms of disease seem more often to recur in the same form than others. I have noticed that cases of suspicion, if they recover and have a relapse, almost always

have similar delusions in their other attacks. Again, among the women we have many examples of recurring mania; the same patient having similar or even the same exalted ideas in each attack.

It is important to note that of the 77 female cases that have relapsed, 38, or as nearly as possible one half, have distinct family histories of insanity; and of the men, 21 out of 47. This strongly bears out what I have already said, that some hereditary predisposition seems to be a cause of recurring attacks, but does not interfere with the prognosis as far as temporary cure goes. The figures given only represent the cases in which it is mentioned what members of the family were affected, and so we have certainly less than the truth. I shall add a few particulars of some of the more interesting cases of relapse.

Jane G—, had a brother insane. Had three attacks of melancholia, in each of which she imagined herself the greatest of sinners, and in each was about twelve months getting well. Her ages in the three attacks were 58, 60, and 71. She quite recovered from the last, and is now well. On neither occasion was any special cause known for the attack.

Eliz. E—, married; patient's aunt insane. Has had three attacks of mania; the first of puerperal origin, the second due to over lactation, and the third to grief and worry. The attacks were similar in character and of short duration. In this case we see dissimilar excitants may produce similar explosions.

Helen F—, single; no hereditary taint. Had three attacks of mania at 17, 18, and 21 years of age. Her first illness was hysterical paraplegia. Each attack was short and violent. In each she fancied she had been seduced, and in each she got well.

Priscilla F—, married; no hereditary taint. Had two attacks of mania; one lasting six weeks, and the other two months. The first occurred at the age of 47, and the second at 61. This is a hopeful case if we are to have no relapse for fourteen years.

Ann Mc'N—; no hereditary taint. Had two attacks of insanity produced by over suckling.

Over suckling, if a cause of insanity, is very often the cause of more than one attack; and the same may be said of pregnancy. I saw a patient recently that had several attacks of insanity always following pregnancy; she was persuaded to separate from her husband, and has had no attack since.

The constant way in which the attack of mania will be preceded by the same delusion is shown in Amy K—, who had some hereditary taint, and always before her attacks imagined she was going to be married. Other cases always begin by drinking to excess, or wandering from home.

One sees among the men the same repetitions of delusions as among women, and I rather prefer cases that repeat themselves to those that vary in consecutive attacks. The repeating cases may reappear many times, and be useful members of society between whiles.

One man, Charles F—, with hereditary tendency, recovered from his first attack at 64, but succumbed to a second similar one at 78.

Hypochondriasis reappears in succeeding attacks, and in many cases it is hard to believe that the patient has ever been quite well.

I shall hope to discuss relapses more in detail in some future article, and will now notice the characteristics of those cases that have been admitted during the past three years for their first attacks of insanity, and have been discharged uncured. By examining these I shall complete my task, having looked at the curable and cured cases, the relapses, and finally the uncured cases.

Of the 600 cases taken for examination, I find 72 men and 79 women, that is 151, were discharged uncured, after twelve months or more of treatment; cases removed before that time at the request of the friends not being included. Of these, 56 men and 61 women were in for their first attack of insanity, and the subjoined table shows the forms of insanity they were suffering from.

	Total		Mania.		Melancholia.		Dementia.		General Paralysis.		Epilepsy.
Males . .	56	...	17	...	18	...	10	...	9	...	2
Females :	61	...	28	...	24	...	9	...	—	...	—

The figures representing the cases of general paralysis and epilepsy are worthless. If reference be made to our annual reports, it will be seen that a great number of the deaths among the men are from general paralysis, whereas the women die more from lung disease and exhaustion following acute illnesses.

In conclusion, I have to thank Messrs. Makins and Hood for valuable aid in the compilation of the tables.

ON FRACTURES OF THE THIGH.

By J. COOPER FORSTER.

THE term used at the heading of this paper is not intended to include the features or treatment of all fractures of the thigh; those of the head and neck of the bone, and of the condyles or about the knee-joint require separate consideration, as they have special treatment; the former, by reason of the nature of the fracture, the age of the patient, and the implication of a joint; the latter, because of the injury to the knee and the imperative necessity to attend to the perfection of after movement of the joint rather than to the position of the fragments of the bone. Few points have been more hotly contested in the practice of surgery than the question of the treatment most applicable for the prevention of shortening in fracture of the shaft of the femur. It is a question which is now, perhaps, taking a more definite shape, but which recent writers on the treatment of fractures still consider necessary to discuss. Whether shortening can be prevented or not, it will scarcely be out of place in these Hospital Reports to give a few remarks founded on my own individual observations, now extending over more than thirty years, and based in great measure upon cases under my own treatment during the last few years. During this time I have carefully seen to the reporting of each case, especially with regard to the accurate statement of the ultimate result. The experience thus attained, ranging as it does

over so long a period, and over several methods of treatment, justifies an authoritative opinion on points still in question.

The first case of fracture of the shaft of the femur with which I was personally connected occurred in the year 1842, under the care of Mr. Aston Key, whose plan of treatment consisted in the application of an apparatus which went by his name. This in reality was an adaptation of the principle of the double-inclined plane, which had been advocated long previously by Pott in the last century, and subsequently by Charles Bell, surgeon to the Middlesex Hospital, in his 'Observations on Injuries of the Spine and of the Thigh Bone.' Pott worked out the rationale of this treatment, and argued that the best way of treating fractures was to relax all the muscles which tended to displace the ends of the broken bone. Having done this the fractured ends were left very much to go on as they could. It is, however, but fair to say that Pott did originally insure rest to the joint involved by keeping the limb in one position on the bed; but surgeons since his day have departed from this part of his practice, and have advocated, above all, the physiological doctrine, as it has been called, viz. that of muscular relaxation only. To insure muscular relaxation to the parts might, at first sight, appear to be only another name for rest to the broken bone, but it is certainly not so; the muscles may be perfectly unstrung, and yet the ends of the bone may be freely moving one upon the other, and I think that it is the non-recognition of the essential combination of both rest and muscular relaxation which has at times led to less satisfactory results in the treatment of fractures than might have been desired. Cases treated on the inclined plane before mentioned show a shortening of about an inch on the average. One could wish that the notes made at the time I speak of had been taken with the accuracy which is adopted now; it would have been interesting to bring forward a table of cases occurring then, and to show whether the treatment of that day could vie with the present, with all its improvements in surgical science and appliances; but it is not possible to do so. Several of my cases state positively that the shortening was three quarters of an inch to an inch; but many, on the other hand, I regret to say, were measured by the eye and not by the tape; and how fallacious that plan is, both the surgeon in his desire for truth, and the

dresser in his eagerness for a good result, well know. Since that day many other forms of apparatus for treating fractures of the shaft of the femur have been adopted, all these having for their principle the fixing of the limb in a straight position—a reversion, in fact, to the old Hippocratic treatment originally in vogue, but which had been discarded for a time in favour of the plan that I have mentioned. Now the flexed and the straight positions of the limb appear obviously to be antagonistic. The one is, as has been said, the principle of muscular relaxation; the other is that of immobility of the joints into which the broken bone enters. The former aims at getting the limb into a good position; the latter takes chiefly into account the processes of repair, and, recognising the fact that Nature, if let alone, does very well, and if hindered, is proportionately liable to fail in her operations, lays predominant stress upon the principle of *rest* as the one thing to be insisted on. The surgeon cannot repair the bone, but he can remedy the displacement. Now, taking these two methods on their merits, it seems sufficiently obvious that the application of a long straight splint to the limb is the more scientific, for the principle of muscular relaxation may well be called the “let-alone” method, the fractured ends of the bones being subject to disturbance by the flexion of the joint which it in part forms; while *rest* is of such importance that any other detail, though it may be acknowledged to be of great value, yet must take a second place. With the long straight splint the muscles, no doubt, are frequently anything but relaxed, but inasmuch as the hip and knee-joint are thereby kept steady, it has been very generally, except in special cases, preferred to the other.

It would thus seem, then, that each method has advantages peculiar to itself, and it doubtless has suggested itself to many minds to endeavour to combine the two, so as to make use of the advantages of both methods, and yet eliminate any parts of the one treatment which militated against the action of the other. It is indeed in this direction that efforts have of late years mostly been made in the treatment of fractures. Muscular relaxation is certainly of cardinal importance, if it can be obtained in association with fixity of the joints. But muscular relaxation must be supplemented by some amount of extension. The requisites of a scientific treatment of fractures

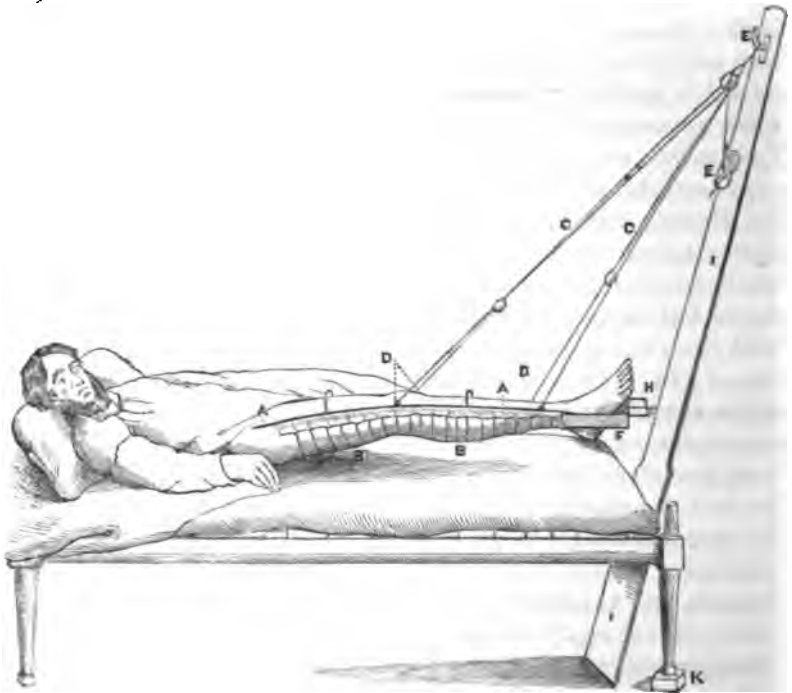
are not satisfied unless this be obtained ; and thus it has been proposed to secure, in addition to rest and muscular relaxation, a certain amount of so-called permanent extension. The necessity of *continuous* extension is so obvious, that when once it has been suggested, every method must provide for its application, at any rate in semblance, or else it would be condemned. The straight splint, as formerly applied by Desault, only gave it this semblance of continuous extension, for the maximum extension was applied at once by the perinæal band, and soon became too little for the stretched but yielding tissues of the limb. The double-inclined plane also gave it only in semblance, for the extension was theoretically made by fixing the knee at the apex of the double incline, while the weight of the body dragged the upper fragment downwards towards the buttock ; nevertheless in practice it was obvious that the buttock generally passed upwards on to the incline, in place of dragging the limb downwards, and thus all extension was removed.

My old master, Aston Key, found this out, and resorted to the straight splint from the incline, thus tacitly confessing that of the two the straight method was the better,—an opinion shared by all who had any experience in the matter. The next advance was the further pursuance of the same principle by the addition of weights to the long straight splint — an advance, without doubt, on the previous treatment, and a plan I have myself very extensively adopted during the last few years. Latterly, many surgeons have been disposed to rehabilitate the inclined plane, only with more perfect recognition of the insufficiency of the old apparatus to carry out the necessary requirements, and by adopting the principle of continuous extension by means of pulley and weight have insured that the body shall make, as it did originally only nominally, some effective counter extension upon the upper fragment, and thus to a certain extent steady the bone while retaining the two ends in apposition.

Imbued with some such general ideas as these it would not be difficult for any one to suggest a form of splint which should fulfil the various requirements I have named, and which should be a model of the most approved form of splint in vogue at the present day for fractures of the shaft of the femur. It

must be one in which the muscles of the femur are in a state of relaxation, therefore it must be a splint in the form of a double incline plane ; it must be one which carries out the principle of rest, and this can only be attained if the limb is flexed by considerable traction upon the muscles. Therefore, it must be some apparatus which allows of a continuous pull upon the limb, which can be increased according to necessity. These requirements are fully carried out by a splint devised by Dr. Nathan Smith. It is thus described by Hamilton :—"It is simply a frame composed of stout wire and covered with cloth, which being suspended above the limb allows the limb to be suspended in turn to it by rollers, the rollers passing around both limb and splint from the foot to the groin. Wire of the size of No. 10 bougie is usually employed. The length of the splint should be sufficient to extend from above the anterior superior spinous process of the ilium to a point beyond the toes, the lateral bars being separated about three inches at the top and one quarter of an inch less at the lower extremity. In the case of a broken thigh, the upper part to which the cord for suspension is to be fastened, ought to be nearly over the seat of fracture, and the lower part should be placed a little above the middle of the leg." The method of suspension as shown by Hamilton differs a little from that I have been in the habit of using, and which I have taken from the plan adopted by Mr. Johnson Smith, Resident Surgeon at the Seamen's Hospital, at Greenwich. It does not, however, differ materially from the plan originally proposed, and consists, as shown in the drawing, of an upright fixed at the end of the bed, to which the limb is slung obliquely by means of a cord and pulleys. A modification of Nathan Smith's splint has been proposed by Hodgen, which seems to me better than the original, and it is this which is figured in the plate. Instead of fixing the splint on the anterior aspect of the leg, a cradle is made of it by attaching transverse bands of calico or bandage, and the limb is laid upon these bands, a stirrup having first been attached to the leg and foot, which is afterwards fastened to the foot piece of the wire cradle. The cords for fixing the leg to the upright are attached to the cradle, which in its turn makes traction on the leg by means of the stirrup.

It may be said, in passing, that though the splint applied as



- A. Wire frame.
- B. Folds of linen converting the frame into a cradle.
- C. Suspending cords and pulleys attached to the cradle at D D, and fastened to the upright at E.
- F. Strapping stirrup fastened to the leg, and from which extension is made, fixed to the cradle at H.
- I. Upright.
- K. Block to tilt upwards the foot of the bedstead.

now described is a modification of Nathan Smith's, the method of application somewhat alters the principles of treatment. Nathan Smith, by applying an anterior splint closely to the leg, does in fact supply an artificial bone in place of the fractured one, which temporarily, so to speak, directs the action of the muscles and obviates their tendency to drag the fragments out of position—a most philosophical and ingenious practice. Hodgen, by placing the limb in a posterior cradle, adopts the

old principle of rest in association with the swing. There is also this further difference, that the anterior splint goes above the hip and fixes that joint, while Hodgen's leaves it free to move. The reason that induced me to adopt the latter, apparently in contradiction to the soundest principles of surgery, was, as I shall explain below, that upon a review of all the methods that have ever been suggested, each appears to give very similar results, and Hodgen's splint is, it appears to me, undoubtedly the one which gives most comfort. It will be observed that this apparatus is somewhat similar to that more commonly adopted, viz. the simple application of the weights. It is necessary in the application of that plan to apply a long outside splint to keep the limb steady; but as regards the traction it is not necessary. The differences are these, that the simple weights are a movable and constantly acting force, whereas in the Hodgen's splint the fractured extremity is the fixed point. Then the extension by weights is made in the same horizontal plane as the recumbent body; in Hodgen's splint the traction is as in an inclined plane. The former has to make allowance in applying extension for an amount of friction which can hardly be estimated, but which goes far in many cases so to neutralise even the extension of a heavy weight, that it has often happened to me to see twelve, fourteen, or even twenty pounds applied to a patient's limb, and yet no particularly excessive pull complained of,—a perfectly unnecessary weight, I need hardly say, if the whole amount were telling on the limb; nay, more, a weight sufficient, if in complete action, to cause considerable pain to the patient, and even some injury to the tissues. All this is obviated in the sling plan. The limb is fixed at an angle, and away from the bed, so that whatever pull is made acts strongly upon the member without waste of force. But after all, the test of the efficacy of any one plan of treatment will still be to many surgeons (though not to the most experienced ones), how much shortening does it leave under careful attention? Up to the present time, and in the case of all hitherto suggested splints, the answer always given to this question by many unbiassed observers has been, that no matter what the splint, the shortening will be about an inch, if the fracture occur in an adult and is not a transverse one. Occasional exceptions to this will be found, but so exceptionally that

they may readily be explained by supposing that in such instances the fracture has been transverse. It is true that many great authorities have stated that there need be no shortening after fracture of the thigh. Desault, South, Amesbury, and others, for instance, distinctly state that judicious management will prevent shortening; but these gentlemen had each and all of them a particular form of splint to which he was wedded, and cannot, therefore, be received as *ex parte* observers. On the other hand, we have Mr. Holthouse examining all the fractures which he could find in the London hospitals, and of fifty cases, all were shortened except three, and it is doubtful whether the measurements of the exceptions were correct. We have Dr. Warren, quoted by Hamilton, writing: "I have never yet seen, either in Boston or elsewhere, after a long and very careful examination, an oblique fracture of the thigh in a patient over seventeen years of age in which there was not some shortening." He adds, very significantly too: "I have had cases shown to me in which it was averred that the limb was not shortened, but on measuring myself I have found the fact otherwise."

On this point no more need be said, than to refer to the tables which are given at the end of this paper. From these it will be seen that forty-seven cases treated by various plans—inclined plane, weights and long straight splint, the limb simply flexed, and lying on the affected side—the average shortening amounted to three quarters of an inch. In a second table seventeen cases are given, in which the fracture has been treated by what I have described as theoretically the most perfect splint yet devised. The shortening in these instances amounted to the very inconsiderable average of one third of an inch. It would appear, therefore, from these figures, that what is conceived as theoretically correct, has been found in practice to be actually so. Notwithstanding these figures, however, I am not disposed to depart from the view I have previously entertained and expressed, that on a review of an extensive number of cases no one plan, in the long run, will give better results than another. These seventeen cases, on examination, are perhaps not so very far more favorable after all. Eight out of the seventeen were patients of fourteen years and under. This is, of course, an age at which it is generally admitted that under any careful treatment but little shortening results; of the other nine, I

think it would be more fair to say nothing, but leave them till a larger number shall have proved or disproved the greater success of this form of splint. Until this is so, I shall continue to think with the latest writer on the subject,¹ Mr. Holmes, that "if they [the limbs] are measured with perfect accuracy, a shortness of *at least* [the italics are my own] half an inch is ordinarily found in the adult." When this has been said, however, it still remains to be noted that this plan of treatment is the most comfortable to the patient, and, on the whole, gives most freedom of body-movement with least disturbance of the fracture. It also allows of greater cleanliness, which is of all the virtues next to godliness, especially in an hospital.

It is usually the case that any departure from simplicity in the apparatus employed in surgical practice is likely to be followed either by the discarding of the plan of treatment or else by its inefficient application and therefore failure. Hodgen's splint forms no exception to this rule. There can be no doubt that its application requires a little more thought and dexterity than Desault's; and then again, in country practice, there may, and probably would be, a difficulty in obtaining the materials for fitting it up. It may even be thought by many that the result is not proportionately so successful as to make up for some amount of additional trouble. But, after all, the galvanized iron cradle can be made at any blacksmith's, and pulleys, cord, and an upright piece of wood are all that are then necessary. With these materials it will not be much labour to any one with an ordinary amount of energy to fit it up.

Of other disadvantages, I at present know of only two: one is, that the extension by the body on the fracture is so effectual that if care be not taken in the application of the strapping around the leg, below the lower fragment, which is in reality the fixed point, excoriation may take place, the strapping cut into the skin, and a troublesome sore result. Such an accident is familiar to all who have had much to do with the surgery of childhood in applying extension in hip-joint disease, but it is not necessarily absent even in the thicker skin and more forcible circulation of the adult, and in one case has actually happened.

¹ 'Surgery: its Principles and Practice,' 1875, p. 269.

The other possible disadvantage is the eversion of the lower fragment with the whole of the foot. This is not troublesome in the case of the long splint, but when the limb is swung, requires careful attention, as it may easily occur, and union then take place in a very awkward position.

Some little care must be exercised in so adapting the bandages upon which the thigh rests that they reach beyond the upper fragment. If this is not done, some bowing may result, notwithstanding the perfection of the extension applied.

It has been a question with many, whether there is any real disadvantage in a little shortening. It may therefore be well to state that an inch difference between the two limbs is a matter of very little moment to the patient. With this amount of shortening all ordinary locomotion can be performed without any inconvenience and with hardly a noticeable limp. It is well known that in the shortening produced by old hip disease, which is far greater than ever results from fracture, very good power of movement is retained by an accommodating curve of the pelvis and spine. The same thing also happens in the case of fracture of the femur.

It only remains for me to thank my colleagues, Mr. Durham and Mr. Howse, for permitting the use of their cases treated by Hodgen's splint, and included in my second table.

Table of Cases of Fracture of the Thigh treated by Weights.

Case.	Age.	Situation.	Treatment.	Shortening.	Stay in hoop.	Remarks.
1	57	Middle	8 to 10 lbs.	1 inch	64 days	
2	8	Near lower epiphysis	6 lbs. and side splint	$\frac{1}{2}$ "	45 "	
3	8	Junction of lower and mid. third	4½ lbs. "	$\frac{1}{2}$ "	46 "	
4	8	...	7 lbs. "	1 "	39 "	
5	7	Below great trochanter	5½ lbs. "	1½ "	42 "	
6	13	"	10 lbs. "	$\frac{1}{2}$ "	49 "	
7	8	"	7 lbs. "	1½ "	49 "	
8	18	Upper third	6 lbs. "	Legs deformed	56 "	
9	9	Middle	4 lbs. "	$\frac{1}{2}$ to 1 inch	52 "	
10	43	Lower third	4 lbs. "	...	60 "	
11	3	Below middle	3 lbs. "	None	20 "	
12	3	Above middle	3 lbs. "	None	24 "	
13	10	Middle	4 lbs. "	$\frac{1}{2}$ to $\frac{3}{4}$ inch	47 "	
14	8	Junction of mid. and lower third	Outside splint and weights	2 to 2½ inches	83 "	Refracture.
15	64	Upper third	8 lbs. and side splint	$\frac{1}{2}$ inch	58 "	
16	5	Intra-capsular	4 to 5 lbs.	None	29 "	
17	56	Upper third	10 lbs.	2 inches	116 "	
18	41	"	...	1½ inch	64 "	
19	23	"	...	$\frac{1}{2}$ "	50 "	
20	25	"	10 to 12 lbs.	$\frac{1}{2}$ "	50 "	
21	6	"	Weights	$\frac{1}{2}$ to 1½ inch	55 "	
22	14	"	Perpendicular extension	None	21 "	Refracture.
23	76	"	12 to 14 lbs.	$\frac{1}{2}$ inch	53 "	
24	54	"	10 to 12 lbs.	$\frac{1}{2}$ "	51 "	

Table of Cases of Fracture of the Thigh treated by Weights—continued.

Case.	Age.	Situation.	Treatment.	Shortening.	Stay in hosp.	Remarks.
25	10	Upper third	5 to 6 lbs.	$\frac{1}{2}$ inch	42 days	
26	4	Middle and separation of epiphysis	6 to 7 lbs.	$\frac{1}{2}$ "	51 "	
27	53	Middle	10 lbs.	1 "	58 "	
28	7	"	Weights	1 "	92 "	
29	59	"	"	$1\frac{1}{2}$ "	71 "	
30	3	"	Perpendicular extension	None	34 "	
31	21	"	Outside splint and weights	$\frac{1}{2}$ inch	65 "	
32	5	Lower third	5 lbs.	None	39 "	
33	21	"	"	Death	...	
34	64	"	Weights	$\frac{1}{2}$ inch	65 "	
35	75	Lower third into knee, compound	Back splint	...	49 "	
36	77	Lower third	10 lbs., back splint	$1\frac{1}{2}$ inch	38 "	
37	53	"	Double inclined plane	$\frac{1}{2}$ inch	79 "	
38	50	Into knee-joint	Straight splint, weights	$1\frac{1}{2}$ "	68 "	
39	21	"	Leather splint	$\frac{1}{2}$ "	41 "	
40	60	Upper third	...	$1\frac{1}{2}$ "	76 "	
41	58	Middle	Straight splint	...	52 "	
42	4	"	...	$\frac{1}{2}$ inch	39 "	
43	7	"	...	None	57 "	
44	13	"	...	...	47 "	
45	6	"	...	...	...
46	9	"	...	$1\frac{1}{2}$ inch	23 "	Refracture.
47	13	"	...	...	82 "	

Old disease of knee.
Came in for non-union.

Table of Cases treated by Hodgen's Splint.

Case.	Sex.	Age.	Situation.	Treatment.	Shortening.	Stay in hosp.	Remarks.
1	M.	45	Lower middle third	Hodgen's splint	$\frac{3}{4}$ inch	Still in	
2	M.	62	" transverse	"	1 "	80 days	
3	M.	65	Two inches above condyles	"	...	"	
4	M.	27	Lower middle third	"	$\frac{3}{4}$ inch	Still in	
5	M.	7	Middle third	"	$\frac{1}{4}$ "	39 days	
6	M.	57	Upper middle third	"	None	83 "	
7	M.	57	Middle	"	"	56 "	
8	M.	45	"	"	"	50 "	
9	M.	14	"	"	"	41 "	
10	M.	38	Upper third	"	$\frac{3}{4}$ inch	57 "	
11	F.	8	...	"	$\frac{1}{4}$ "	57 "	
12	M.	14	Junction of upper and mid. third	"	$\frac{1}{4}$ "	49 "	
13	M.	11	Middle third	"	$\frac{1}{4}$ "	41 "	
14	M.	10	Middle	"	$\frac{1}{4}$ "	41 "	
15	M.	64	Lower third	{ Outside splint at first; } { Hodgen's after refracture }	2 $\frac{1}{4}$ —1 "	141 "	
16	M.	14	Upper third	Hodgen's splint	None	46 "	
17	M.	12	Middle	"	$\frac{3}{4}$ inch	43 "	

ON MENINGEAL HÆMORRHAGE.

By JAMES F. GOODHART, M.D.

SEVERAL cases of meningeal hæmorrhage have been met with in our post-mortem room during the last year or two ; none of them, so far as I know, had been diagnosed during life ; indeed, they would appear to have presented so little definiteness of symptoms, that it was perhaps hardly probable that they should have been. This fact, and a sense of my own want of further information on the subject, led me to collect other cases that are scattered through our records, and the result of this search is embodied in the table of cases which form the basis of this paper. I believe this to have been by no means a work of supererogation, for to get anything like an adequate notion of the disease it is necessary to consult a somewhat extensive range of book lore. This appears to be not so much from a want of knowledge of the subject ; on the contrary, most writers on cerebral diseases appear by their references to it to be fully cognizant of its features, but from the fact that, though considered a distinct disease, very few have taken the trouble to treat of it systematically. This is not the place to attempt to remedy altogether any deficiency that there may be in this matter, but it is essentially the place for recording the experience of the hospital, and therefore it is that I venture, even at the risk of some prolixity, to give a short abstract¹ of all cases

¹ Dr. Wilks has already published some cases of "Meningeal Apoplexy" in our 'Reports,' ser. iii, vol. v, 1859. To make my series complete one or two of these not resulting from, or only doubtfully due to, injury, have been briefly reproduced.

of meningeal or arachnoid hæmorrhage that I have been able to find existing in our records. In many cases, from injury and otherwise, meningeal, arachnoid, and cerebral hæmorrhage are found together; but inasmuch as my object is to deal here only, so far as this is possible, with the two former, some cases have been excluded on account of their complications.

Under the term meningeal hæmorrhage I shall include all cases in which the extravasation takes place upon the surface of the brain, whether within the arachnoid cavity or underneath it. In either case the blood is more or less diffused over the surface, with a considerable tendency to gravitate towards the base, and this constitutes its chief danger. Whether the blood confine itself to the vault, or gravitate towards the base would appear, however, to depend somewhat upon the locality of the hæmorrhage. Mr. Prescott Hewett¹ makes the statement, that when it takes place *within* the arachnoid cavity, the blood is but rarely found at the base. "In the majority of instances the blood corresponds to the cerebrum, rarely to the cerebellum, and still more rarely to the medulla oblongata." I have not myself observed this difference in the behaviour of the blood in the two cases, nor does it appear to have been noted in the reports of our cases, possibly because in the larger number of instances the hæmorrhage has been spontaneous and *subarachnoid*.

Etiology.—This is a part of the subject by no means without interest, since it involves several questions which have at one time and another caused considerable discussion. Cerebral hæmorrhage has been attributed to various conditions: to increased tension of the blood in the encephalic circulation; to damage or degeneration of the cerebral substance leading to a loss of support to the blood-vessels running through it; and to a substantive disease of the arteries themselves. The latter hypothesis, if true, brings under our notice the further question of the nature of this disease of the blood-vessels, and has a bearing upon the hyaline fibroid theory advanced by Sir W. Gull and Dr. Sutton. All these explanations of sanguineous apoplexy can claim some facts for their support, but only the first and third will require consideration in a paper devoted to superficial hæmorrhage.

¹ 'Holmes's System of Surgery,' "Injuries of the Head," 1870.

With reference to them, and to show what a collection of cases says upon these points, I subjoin a table of forty-nine cases. Thirty-six of them are from the post-mortem records of Guy's Hospital for the last twenty-one years. The others I have collected from the 'Transactions of the Pathological Society of London.' The sex, age, weight of the heart, condition of the cerebral vessels, and the state of the kidneys, are placed in separate columns. (See p. 134.)

From this table it will be seen that of the total of forty-nine cases, eight are probably due to injury, and are therefore not available for a conclusion as to the cause of spontaneous meningeal hæmorrhage. The remaining forty-one show that twenty had renal disease, thirteen of which were associated as usual with hypertrophy of the heart; in two more it is probable that the same conditions existed, and six others had hypertrophy of the heart without renal disease. Thus twenty-eight out of forty-one, two thirds of the whole number, occurred with a state of kidney or heart which is known to bring about increase of the blood pressure in the arterial system. This result I was hardly prepared for from the knowledge imbibed from the various textbooks. I had come to the opinion—a somewhat vague one it is true, and perhaps, though I am not aware of this, upon insufficient knowledge of what others have written on the subject—that meningeal apoplexy was a very obscure disease, and likely to occur no one knew when or how, but mostly in such cases when it was never expected. But this is not so: it happens under conditions which are sufficiently constant to make it quite possible to form a correct diagnosis. Of course, if one devotes but a little thought to the subject, it becomes obvious that the surface cerebral circulation is under no such peculiar regulations as would render it likely that bleeding should take place there under conditions different from those which lead to apoplexies of the substance. If the surface vessels are under any different conditions at all, they are merely of degree, not of kind. They might indeed have been expected to rupture under increased tension more frequently than they do, and indeed more often than the smaller and less exposed arteries of the interior. But this they do not do, and from some cause, not very obvious, meningeal hæmorrhages are far less common than those of the substance of the brain, though when

Table of Cases of Meningeal Hemorrhage.

No.	Sex.	Age.	Heart.	Cerebral Vessels.	Kidneys.	Remarks.
1	M.	63	14½ oz.	Small, ? healthy	11½ oz., granular	Mitral stenosis also.
2	M.	38	25 "	...	8 "	—
3	M.	65	13 "	Atheromatous, but not extremely so	12 oz., rather granular	Died of erysipelas.
4	M.	55	13 oz., left ventricle thick	Healthy	13 oz., healthy	—
5	F.	36	11½ " hypertrophied	"	10½ oz., granular	Apoplexy of pons also.
6	F.	35	14½ oz.	...	9 oz.	—
7	M.	45	14 "	...	5 oz., granular	—
8	M.	47	Much hypertrophied	...	13 oz., very diseased	Phthisis and morbus Brightii.
9	F.	46	11½ oz.	...	19½ oz., mottled and bad	Ulcerative endocarditis.
10	M.	34	15 "	Quite healthy	Large white kidneys, 16 oz.	—
11	M.	43	11 "	...	Rather granular	—
12	F.	17	9 "	...	Healthy	Rheumatic endocarditis, aneurism of middle cerebral artery.
13	M.	32	14½ "	...	5 oz., granular	—
14	M.	57	13 oz., left vent. hypertrophied	Not good	13 oz., bad and fatty	Hemorrhage into brain also.
15	M.	23	15½ " very "	...	7 oz., granular	—
16	M.	69	...	Not much diseased, aorta bad	Very bad	—
17	M.	4	...	...	Albuminuria	Thrombosis of lateral sinus.
18	F.	67	Small and flabby	Much diseased	Small and degenerating	Sudden death.
19	F.	59	1½ oz., fatty muscle	Brain healthy	Healthy	Cancer and anæmia.
20	M.	18	8½ oz.	...	11 oz.	Epilepsy and phthisis.
21	F.	20	9 "	...	...	Phthisis, purpura.
22	M.	53	11 "	...	13 oz., bad and granular	Purpura.
23	M.	34	...	...	Healthy	Anæmia.
24	M.	51	11 oz., fatty muscle	...	10 oz., " healthy	Typhoid fever.
25	F.	31	11 " "	...	8 oz.	"
26	M.	18	9 oz.	...		

they occur they are generally found in association with the same morbid states as are present in the commoner form. Extravasations of blood about the anterior half of the corpora striata, and in other parts of the interior of the brain, have long been known to be associated with renal disease and hypertrophy of the heart—the one set of conditions has generally been assumed to be consequent on the other—and there seems no reason, from the consideration of its causes, to dissociate meningeal from cerebral apoplexy, or to separate the two as distinct diseases. But then comes the question, allowing the association of large heart, renal disease, and hæmorrhage, superficial or deep, may not the conditions all be the result of a primary arterial disease? MM. Bouchard and Charcot,¹ indeed, consider sanguineous apoplexy to be due, in the majority of cases, to primary disease of the cerebral vessels. In support of this opinion they bring forward sixty-five cases of apoplexy in which they found miliary aneurisms on the vessels in the neighbourhood of the extravasation and elsewhere in the substance of the brain. These, they say, were due to a sclerosis of the outer tunic of the vessels, which had gradually led to atrophy of the muscular coat, and so to dilatation. They would consider it a diffuse periarteritis, extending throughout the vessels of the brain, and differing by its localization in the outer tunics of the vessels from atheroma, which begins in the internal coat. From this fact, and also because the morbid change in the outer coat may exist without any atheromatous change at the base of the brain, and because they have never met with a similar state in the arterial system of other parts of the body, they propose to look upon the disease as one peculiar to the encephalon. Of the facts which MM. Bouchard and Charcot detail there can be no doubt. They record a large number of cases of sanguineous apoplexy associated with miliary aneurisms, visible to the naked eye; and other observers, Heschl, Meynert, Bastian, and Douglas Powell, have corroborated them.

Whether the conclusions founded upon these observations are sound is quite another question. They are two: first, that the disease is a periarteritis, and secondly, that it is a disease

¹ "Nouvelles Recherches sur la Pathogénie de l'Hæmorrhagie Cérébrale," Brown-Séquard's 'Archives de Physiologie,' 1868.

peculiar to the cerebral vessels. Against the acceptance of either, in its entirety, there are several objections. For instance, the disease in question is one of old age, and is associated in a considerable number of cases with atheroma, with granular kidney (twenty-three out of sixty-six had renal disease; in twenty-three others no note is made of the state of the kidney), and with enlarged heart—the very conditions most favorable for the production of an aneurismal condition in the vessels. And then, again, it is impossible to consider the morbid changes described by our authors as different from that which Sir W. Gull and Dr. Sutton have described as a hyaline fibroid degeneration of the arterial walls, and have found as one of the conditions of senility. But the latter is a change which is met with not only in the brain, but in all the small vessels of the body, of the brain, skin, connective tissues, and solid viscera. If I am right in supposing that the two different descriptions really apply to the same disease, then it follows that the one affection is not anything peculiar to the brain, but is widespread throughout the body. That similar aneurisms are not found so frequently in other parts is easily accounted for by the fact that there are few vessels so little supported by surrounding tissues as are those of the brain.

Well, then, if the condition is a general one of all the small blood-vessels, and if such condition is most frequently of any associated with chronic renal disease, and if one of the most prominent features of renal disease is increased blood pressure in the vessels; when also there are other cases which seem to show that a large heart alone has a tendency to produce too great distension of the vessels of the brain, and so to lead to extravasation of blood; then I think that the theory which ascribes apoplexies chiefly to anomalies in vascular tension, is the one which can be supported by the soundest arguments, and is therefore most likely to be correct. We know what excess of work does for the larger vessels; how the soldier, the blacksmith, the lighterman, have a special risk of dilatation of the aorta and aneurism; how the branches of the pulmonary arteries of a confirmed bronchitic become first hypertrophied and then atheromatous. We also know now more exactly than formerly from the observations of those who have worked with the sphygmograph that as soon as the

kidney begins to excrete its urea imperfectly, probably also as soon as the liver ceases the sufficient formation of urea, the blood pressure within the vessels is increased ; and as soon as this is so, the heart and arteries receive additional work. If these are facts, and they afford, as in that case they certainly do, a reasonable explanation of cerebral hæmorrhages, it is unnecessary to take up any other view which cannot be supported by other observations at least equally capable and numerous.

With regard to the nature of the disease in the small vessels, it is certainly worthy of remark that the observations of MM. Bouchard and Charcot afford independent witness, as it seems to me, of the reality of the hyaline fibroid degeneration, which has been considerably discussed of late. The former also say that it is distinct from atheroma ; and if so, it might be urged against the remarks I have just made, that if the disease were due to strain, it ought to be an atheromatous change. But this "*periarteritis chronica*" is found with extreme atheroma in half their cases, so that both states may at any rate be looked for under similar conditions, whether or no both come about from the same cause. My own opinion is, that both the appearances noticed by the French observers and by Sir W. Gull and Dr. Sutton, as well as those by Dr. George Johnson, are quite capable of reconciliation. They may, I think, very well be due to a general hypertrophy which takes place under the conditions that have just been mentioned, and the existence of which with regard to the muscular coat has been so strongly contested for, and, as I think, proved by Dr. Johnson. It is no new theory that usage leads to hypertrophy ; and it is, to say the least, not improbable that the external fibrous tissues of the arteries take part in the hypertrophy in common with the muscular coats. But when once any fibrous tissue begins to hypertrophy, it is not unlikely to outstrip altogether the necessities which started it—a hypothesis which is proved in the case of the lung and many other parts the subject of fibroid change—and in doing so it crushes out the other tissues and takes their place. Hence, the view which I believe to be essentially correct, and which I hold with regard to these disputed points, is that this arterial sclerosis or hyaline fibroid degeneration on the one hand and the thickened muscular coat

on the other, are both to be found in cases where from any cause whatever there has been undue strain upon the smaller arteries, and are both truly hypertrophic in their nature; that the two states are more or less coexistent in all cases, but that they are to be found in different cases and at different stages somewhat altering in the proportion which the one change bears to the other. It is also to be remembered that the vessels in many parts, and of all others the vessels in the brain show this best, are surrounded by a system of lymphatic vessels, which, as life goes on, are less needed and less active; many, I believe, close up altogether, and thus give a fibroid appearance to the arterial coats and parts around, which, though it may be called disease, is really only one of the closing processes of life. Many fibroid changes are thus really only atrophic in their nature.

Certain cases of disease in the cerebral arteries in constitutional syphilis might perhaps be adduced as less equivocal instances of a primary disease in the arterial system; but even in these I should much prefer to say that such a localization was a proof, not of the inherent tendency of the cerebral arteries to become affected, but of their disproportionate use and consequent disproportionate wear and malnutrition, which rendered them liable to suffer in common with other exposed parts, and to come to appear as selected spots.

Though I am then indisposed, as has been said, to accept M. Bouchard's theories in their entirety, I by no means wish to imply here that no primary disease exists in the vessels of the brain. On the contrary, I think that such primary disease does occasionally occur, though I do not think it often does so independently of diseases in other viscera which are associated with increase of arterial tension.

Meningeal hæmorrhage is due not infrequently to rupture of an aneurism in one of the arteries at the base of the brain. Sir W. Gull even goes so far as to say that "whenever a young person dies with symptoms of ingravescent apoplexy, and after death large effusion of blood is found, especially if the effusion be over the surface of the brain in the meshes of the pia mater, the presence of aneurism is probable."¹

This would seem to controvert my opinion that the miliary

¹ "Cases of Aneurism of the Cerebral Vessels," 'Guy's Hosp. Reports,' series iii, vol. v, p. 281.

aneurisms are caused by high tension and its consequent hypertrophy; but it is not so. When the one aneurism occurs in young people, it is not an indication of a general aneurismal state of all the vessels, but is generally a sequela of valvular disease of the heart, and is probably embolic in its origin. The local obstruction to the onflow of blood leads to undue pressure and distension behind the plug and to dilatation and acute aneurism. In the cases tabulated, only two were due to local aneurism; one occurred in an old woman with very bad vessels and granular kidney, the other in a young girl of seventeen, who had lately had rheumatism, and in whose viscera numerous embolic infarcts were found post mortem; a case in point.

In most if not all of the others careful search was made without finding any source of the hæmorrhage. There can assuredly be no necessity for the formation of an aneurism to produce meningeal or other cerebral hæmorrhage; this I should say is plainly indicated in the apoplexy in miniature so often seen in the retina in cases of chronic Bright's disease¹ and congestion of the optic disc, conditions obviously associated with increased blood pressure.

It would appear that mere over distension in vessels which are but badly supported by their surroundings is quite sufficient for the production of hæmorrhage; and thus it happens that sometimes a sudden excitement or fit of passion causes death. Two other cases in the table also support this conclusion² (Nos. 27 and 28), and they are worthy of all attention as in-

¹ Dr. Liouville has, however, found miliary aneurisms even in the retina. '*Gaz. des Hôpitaux*,' 1870, p. 141. Sur la coexistence d'alterations anévrysmales dans la retine avec des anévrysmes des petites artères dans l'encéphale, par M. Henri Liouville.

² It would seem not at all unlikely that the convulsions and vomiting seen occasionally together in whooping-cough may be also due to some small meningeal hæmorrhage brought about by the violent expiratory effort and the consequent arrest of blood in its passage through the lungs. The late Dr. Bright records two such cases in his '*Reports of Medical Cases*.' Russell Reynolds, '*On Epilepsy*,' p. 225, and Hughlings Jackson (Reynolds' '*System of Medicine*') urge against this form of cerebral hæmorrhage, the fact that it is exceedingly rare in the severest paroxysms of chronic epilepsy. But its non-occurrence in chronic epilepsy is quite explicable by the state of the cerebral circulation and the toughness of the membrane found in it, and does not do away, in the least, with the probability of hæmorrhage in other cases.

stances of a not at all improbable occurrence during the administration of chloroform. In the first case it must have ensued purely upon the congestion during inhalation of the drug, due no doubt to inefficient respiration; in the other, however, in addition to the anæsthetic, the cerebral circulation was interfered with by pressure upon the carotid, and also not improbably on the internal jugular to some extent. That chronic bronchitis and emphysema do not commonly lead to cerebral hæmorrhage is no doubt due, as Dr. Hughlings Jackson points out, to the lessened tension on the left side, which follows upon prolonged obstruction on the right.

Three cases are noted as occurring in association with purpura: they are rightly noticed together, to indicate that purpura may lead to meningeal apoplexy; and when extravasation of blood takes place in the purpuric state into solid tissues, no one can be surprised that it should occasionally also occur in the brain, a possibility worth bearing in mind in scorbutic affections, as explaining the very obscured mental condition which at times occurs, and also because it will be useful when forming a prognosis. There is, however, an additional feature of interest in regard to them, because it is possible that they too may result from vascular obstruction in the first instance, and subsequent extravasation. Minute emboli would probably lead to some such condition, and cases have been recorded where in states of anæmia the smaller vessels have become blocked by leucocytes, behind which extravasation has occurred. The two cases of anæmia, fatty degeneration of the heart and meningeal apoplexy, probably belong to the same category,¹ as also the case occurring in typhoid fever. I am unable to express any opinion upon the presence of emboli in any of these cases, or on the theory of their occurrence by the process of embolism. All that I am anxious to enforce here is, that besides the large group of cases occurring under conditions of high blood pressure, there is a second smaller one associated with deteriorated blood states, in which the patients are liable to the supervention of cerebral symptoms. Whether such cases are due to a degeneration of the

¹ Dr. Quain has suggested that these also are due to obstruction to the return of blood to the right side in consequence of the right failing to maintain the circulation through the lungs; but both from a clinical and pathological point of view such a hypothesis seem to me to be hardly tenable.

vessels, to vaso-motor disturbance, to embolism, or to an altered quality of the blood, more observations are wanted to determine than we at present possess.

Two other cases remain to be mentioned as included in the table, both being recorded in the Pathological Society's 'Transactions.' The first is one of syphilitic disease of the cranium and dura mater, associated with meningeal hæmorrhage. A man, of thirty-five, had suffered much from syphilis for many years. Three or four months before his death he was attacked by convulsions on both sides of the body, but chiefly on the left, followed by a state of unconsciousness lasting thirty days. He subsequently had other convulsive attacks without loss of consciousness, the left side of the body being rather weaker than the right, and its sensibility slightly less. He gradually expired, never losing his consciousness.

At the post mortem, a thick layer of yellow material was found on the inner surface of the right side of the dura mater, the brain being compressed by it, and the arachnoid cavity on the same side was occupied by a semitransparent brownish membrane.

The other case, published in the seventeenth volume of the Pathological Society's 'Transactions,' p. 4, is that of a man, æt. 78, who had been excited and demented for some weeks before death. A false membrane, firmer and thicker on the left side, and apparently formed from extravasated blood, covered both cerebral hemispheres.

I have not made more mention of these, because I very much doubt whether they should be included with cases of meningeal apoplexy, such as I have described. Both are allied to the hæmatoma of the dura mater of Virchow,¹ and are inflammatory affections of the dura mater or other membranes, and not primarily extravasations of blood. Nor does this appear to be a frequent or indeed likely termination of meningeal apoplexy. All the cases of bygone meningeal apoplexy that I have seen and all that are given in this paper record their occurrence by no more than a staining of brown colour, and more or less destruction of the grey matter beneath. There has been no cyst, and hardly anything that could be called new membrane.

There are, however, cases reported, notably those by Mr.

¹ 'Die krankhaften Geschwülste,' band i, 1858, p. 140-141.

Prescott Hewett,¹ in which there has been a clear history of injury, insensibility, persistent head trouble after recovery, and subsequent death, where blood cysts have been found post mortem, which can hardly have originated otherwise than by injury. But it is probable that these have always been cases of hæmorrhage, rather exceptional in quantity, into the arachnoid cavity. Subarachnoid hæmorrhage never, I believe, gives rise to any subsequent cysts. In the arachnoid, however, the blood is stated to collect at times in rather large quantity on the surface of the hemispheres, and in such cases it may not improbably eventuate in a cyst such as was found in Dr. Quain's case, recorded in the Pathological Society's 'Transactions.'²

Mr. P. Hewett thinks that various stages in their formation have been met with sufficiently often in this form of hæmorrhage to show that the cyst is the result of the extravasation and not of an inflammatory state. Were it not for this, and judging from the size of the cysts found, one would be disposed to think it improbable that so large a clot of blood as the cysts recorded must represent could give rise to so few symptoms, and would incline to the view that a condition, at least in part inflammatory, was assumed at some date subsequent to the original injury.³

After all, however, such cases must be very rare, since I find no instance of anything of the kind in our records. One case occurring to the late Dr. Hodgkin is recorded in that physician's 'Morbidity Anatomy of the Serous Membranes,'⁴ and is mentioned by Mr. Hewett,⁵ but I know of no other occurring at Guy's Hospital.

Some writers have attempted to distinguish between hæmorrhage *into* the arachnoid cavity, and hæmorrhage *beneath* it, in the meshes of the pia mater. But discarding traumatic cases such as those of injury to the lateral sinus, in which inter-arachnoid bleeding has been recorded, and those of hæmorrhage into the arachnoid from other forms of injury, the arachnoid variety and that in the pia mater have no dis-

¹ 'Holmes's System of Surgery,' art. "Injuries of the Head," p. 280, &c.

² Vol. vi.

³ On this point see also P. Hewett, 'Med.-Chir. Trans.,' vol. xx, p. 45.

⁴ 'Path. Soc. Trans.,' vol. vi, p. 8.

⁵ 'Med.-Chir. Trans.,' vol. xxviii, p. 57.

tion, pathologically : the former is indeed the result of the latter. I have previously called attention to the fact that the blood is said to occupy not quite the same position in each case.

The symptoms of meningeal apoplexy have next to be considered, and these must first be elucidated, if possible, by a reference to the cases which form the basis of the paper. The difficulty of diagnosis in superficial hæmorrhage of the brain has been already pointed out in these 'Reports,' by Dr. Wilks (Series iii, vol. v, 1859), and it is not my purpose to discuss *fully* the differential diagnosis (if there be such) between this and other forms of cerebral disease. My object is merely to record the facts, and to see how far they corroborate others previously reported.

Coma was present in fourteen of the cases : it was generally profound and ushered in death ; but in some it was only partial, and in three was temporarily recovered from. It was frequently associated with convulsions, and in five cases with hemiplegia.

Convulsion.—It might be supposed that with a disease so purely confined to the surface of the brain as this, muscular spasm of some sort or other would be a common symptom. It really does not appear that it is so. Rigidity is only remarked four times in the whole number of cases. Twelve are said to have had convulsions ; but of these it must be said that in two at least the symptom was probably the outcome of an epileptic habit, and in others was uræmic. It would thus appear that in only a small proportion will rigidity be present ; and in these, though affording a valuable suggestion, it must not be relied upon as of much positive service for diagnosis apart from other features, since it is present and much more markedly in other diseases of the brain surface, as, for instance, in arachnitis after fracture of the skull, and in tubercular meningitis. It is worthy of note, too, that rigidity is a symptom not necessarily connected with surface injury at all. A boy was admitted, under Mr. Durham's care, on October 21st, for concussion of the brain, in which the one great symptom was a very marked rigidity of all the extremities. He was fifteen years of age, and had fallen fourteen feet. When admitted he was unconscious, and had left hemiplegia, which passed off, and was succeeded by the rigidity. The pupils were contracted, the right

rather more than the left. The next day he was still unconscious, though slightly sensitive to pain ; but now he had some slight convulsive movements of the eyelids, the right especially ; the pupils were minutely contracted, and the left side of the face was fallen. On the 23rd the coma had increased and the rigidity diminished, and now the eyes were turned forcibly to the right side, the pulse mounting rapidly, and the face becoming livid. He died in this condition a few hours later.

I saw this case soon after his admission, and thought from the extreme rigidity with coma, that it might turn out to be a case of meningeal extravasation. Subsequently, however, the deviation of the eyes to the right, though not absolutely against it, was more suggestive of some lesion in the substance of the brain on that side.

At the post-mortem this was the state of the brain :

The surface was very red, but without the extravasation of any blood in the form of clot. The outline of all the minute vessels, instead of being clearly defined, was blurred, as if their colour had run ; yet, as no decomposition had occurred, this must have been due to slight ecchymosis in all the small vessels. The corpus callosum was studded with congested vessels without actual extravasation, and at its posterior boundary on the left side both grey and white matter were yellowish, and the posterior part of the left lateral ventricle was found studded with many very closely set capillary ecchymoses, so close, indeed, that the merest streaks of white substance could be seen between them. The under surface of the corpus callosum and fornix was in a similar state. The corpora quadrigemina had escaped, but each corpus striatum had small extravasations in it, and the ventricles each contained about two drachms of fluid.

Headache in the occipital region and pain in the neck were marked symptoms in only four cases, and for the rest delirium was occasionally noticed, as also were irregularity of the pupils, stupidity, and incoherence. Rolling of the eyes inwards and outwards was noted in one case, but no instance occurred of fixed deviation of the eyeballs to one side or the other, such as has been noticed occasionally to cause meningeal to simulate cerebral apoplexy.

Sudden death occurred in four of the cases.

We are here presented with but a meagre array of symptoms ;

and taken as they stand, they are absolutely wanting in any pathognomonic significance. Putting aside the fact that there is no one sign of meningeal hæmorrhage, so many of these cases were comatose on admission and quickly died, that it is evident fatal cases are not those which will afford much valuable matter for helping us in diagnosis. Not to make the paper unnecessarily long, and wishing to avoid doing more than record proved facts, no cases have been inserted which have not been verified as cases of meningeal hæmorrhage by a post-mortem examination; but I think it would be more reasonable to go into the surgical wards, and take some of the many cases of injury to the head as giving the most valuable teachings with regard to diagnosis. It is indeed the experience which I gained as surgical registrar which leads me, in apparent disregard of the symptoms just tabulated, to say that that one which of all others would most lead me to suspect meningeal hæmorrhage is typically portrayed in Case 29. It is a permanent or rather persistent stupidity after an injury, or following upon some convulsive seizure.

Five or six cases at least come to mind where for many days and even weeks after an injury to the head the patient has remained stupid and intellectually apathetic, notwithstanding the perfect recovery of all his muscular power. Other instances also are not uncommon which have been admitted with a history of some sudden fit followed by a persistent semicomatose condition, and where the question has been discussed whether the coma was caused by a fit or by the injury due to the fall. They have been ascribed to epileptic coma, but such an explanation is exceedingly unsatisfactory. Epilepsy is essentially a transient thing, and to find a comatose state remaining for days afterwards without paralysis is exceedingly suspicious of some actual surface lesion in the shape of extravasation of blood.

It is important to remember also, that an epileptic may crack his skull by falling during a fit. Such cases are to be found in all hospitals.

Cases of so-called cerebral irritation are also not unlikely to be thus due to more or less extravasation. A boy is admitted for severe concussion; at first comatose, he gradually recovers to a certain extent and then remains stupid, or perhaps in the

far less pleasant condition for those around him, shrieking loudly whenever he is disturbed, yet without any paralysis or evidence of any injury beyond that to his intellectual powers, which he makes so obvious to all. But these all get well, and are not available for our purpose. The symptoms of meningeal hæmorrhage, if drawn from such cases, would be far more varied and of more intricate combination. Of the fatal cases the summing up is much more brief, and resolves itself into—coma: sometimes complete, sometimes incomplete; now associated with some amount of general paralysis; now with some amount of hemiplegia, not perhaps entire in its distribution; at other times with no paralysis at all: ushered in sometimes by intense headache in the occipital region, and liable in severe cases to produce speedy death, or, if ending in recovery, to be followed by considerable mental impairment for some time to come.

Meningeal hæmorrhage, more especially if the effusion be sudden and profuse, may resemble an apoplectic effusion into the pons Varolii, for in such a case the coma is profound and the paralysis general as when the pons is affected. Whether the state of the pupils might give some indication for a diagnosis seems uncertain, but the meningeal disorder is more likely to affect one side more than the other, and so to produce irregularity than an apoplexy of the pons, which would, as has been shown by Dr. Wilks, generally lead to contraction of both. All observers, however, agree that the state of the pupil is so variable in cerebral hæmorrhage that its indications cannot be relied upon.

Tubercular meningitis has been said to simulate arachnoid hæmorrhage, and on a comparison of symptoms no one is present in either which may not exist in the other. The fever, headache, irregularity of pulse, vomiting, convulsions, rigidity, coma, all may be found in both conditions, but it is hardly likely that in any one case of meningeal apoplexy the sum total of symptoms will thus be likely to mislead. In tubercular meningitis they will probably all be present; in the apoplectic disease only one or two. Drunkenness, also, is not unlikely to be mistaken for it; and on this point it will be well to bear in mind a remark of Dr. Hughlings Jackson, that if the history of any convulsion can be elicited as occurring at the

onset of the comatose state the case under discussion is not one of alcoholism.

The diagnosis must be formed from a consideration not only of the *symptoms* which the patient exhibits, but the *aspect* of the patient himself. If he is old and wrinkled, with dry skin and rigid arteries, or long and hard pulse, he is one who may be said to have nascent apoplexy; and when these signs are associated with those of sudden coma, and more or less general paralysis and some rigidity, it is always safe to consider the case an apoplectic one, and to treat it accordingly. It may, perhaps, turn out to be mere drunkenness after all. But what matter? All risk is avoided, by so acting, of having to appear at a coroner's inquest, charged with neglect or ignorance. In like manner, in a young person should be obtained all the evidence possible as to the state of the heart, both as to its size and its valves, since meningeal hæmorrhage followed by coma and general paralysis of sudden onset are frequently due to aneurism and embolism, the result of heart disease, and have even been found in simple hypertrophy. Meningeal apoplexy has no symptoms peculiarly its own.

Prognosis.—Meningeal apoplexy is stated in text-books to be a very fatal disease. Dr. Ramskill writes thus in Russell Reynolds' 'System of Medicine': "On inspection after death, which seems to be an invariable termination of the disease." And again, "From the fact that no old cysts are ever discovered between the arachnoid and pia mater, it is inferred that sub-arachnoid hæmorrhage is invariably fatal." Niemeyer states that the apoplectic fit is usually very severe, and the bleeding abundant. But the facts at our disposal hardly bear out such strong statements. We find, indeed, (1) that cases of recent meningeal apoplexy are met with in the post-mortem room, in which it does not appear that the patients have ever suffered from, much less died with, any cerebral symptoms. (2) A proportion of cases are found in which the hæmorrhage is of old date, *i. e.* they have recovered more or less completely. And (3) a large number of cases of concussion of all degrees of severity go out of an hospital well. Now, if one considers for a moment the conditions which must ensue when a severe blow is transmitted through the skull to the soft and vascular brain, one cannot but suppose that, notwithstanding the skull-beams and a water-bed,

the brain must in many cases be bruised, and that considerably; and brain-bruising is equivalent to extravasation of blood on the surface as elsewhere. Further, it is now well known, from Mr. Prescott Hewett's observations, followed up by others, that never a case of fatal concussion goes to the dead-house but what more or less extravasation and ecchymosis are found. To this there is, of course, the ready objection, that the brain is bruised in the fatal cases, and not so in those that recover. But, I ask, is this likely, in the first place, and secondly, all surgical experience would bear out the remark on a comparison of cases, as far as can be, that it is not always the worst case of concussion that dies. Some people die easily, or rather from comparatively slight causes. Others, with a patron saint, like the feline goddess, "take a deal to kill;" and therefore, I suppose, a severe case of concussion may get well, while one apparently less severely injured dies. Not that this is the rule, I would not be misunderstood, yet many cases of severe concussion, including with these, not a few of fracture of the base of skull, get well, and of this number it is probable that some, I dare say many, are instances of a meningeal apoplexy repaired.

Prescott Hewett remarks that extravasation into the arachnoid is by no means uncommon; that it results often from a trifling contusion and without any apparent injury to the brain or membranes. My own experience fully accords with this, and hence, if the hæmorrhage be not severe there seems no reason whatever why such cases should not get well; and that not only slight cases, but very severe ones too, do get well is abundantly proved by the occasional occurrence of old blood cysts about the arachnoid, such as have been already alluded to.

There would appear, however, to be some warrant for saying that on the whole the prognosis in subarachnoid hæmorrhage is the worse for the reason before stated, that blood in the meshes of the pia mater collects about the medulla and pons, and by its pressure interferes with the nerves and ganglia at the base of the brain. This, however, is a distinction which is hardly likely to be of use, for it will be but seldom that it will be in anyone's power to diagnose between the two, and, moreover, both forms are so often found together. On this point Prescott Hewett says that though it was at one time thought that the wide-spread subarachnoid hæmorrhages produced more urgent symptoms than

those collections of blood in mass which give rise to less general pressure, further experience has not confirmed this opinion. However this may be, all the facts show that the fatal cases are those in which the blood has collected in quantity at the base of the brain and entered the ventricles. It is stated by Mr. Hewett himself and others, that arachnoid extravasations keep to the cerebral hemispheres. It would therefore seem to follow that the subarachnoid form is the worse of the two.

Granting, however, that patients do get well, the future is not altogether free from anxiety. Case 29 shows what care should be exercised to avoid all excitement, and how even some months after the original injury, the damaged brain may be unequal to any acceleration of the circulation, and may even suffer a fresh hæmorrhage.

Though I have here contended for a somewhat less grave prognosis than an inevitably fatal one, there can be no question that a large number of cases of spontaneous hæmorrhage in the membranes of the brain prove speedily fatal; and in not a few—four of forty-nine cases in the table—death may be said to have been almost instantaneous, or within a few minutes at most. But it is not to be concluded because these the worst cases die that the majority of cases are necessarily fatal. The prognosis in any individual case must depend upon the suddenness of the onset of symptoms; the completeness of the coma; the condition of the heart; the hardness of the pulse (tension), and the state of the arteries. The amount of pallor and collapse immediately produced by the leakage is also to be noted as giving some indication of the amount of the extravasation, and thus leading to a correct forecast of the result to be apprehended. To the same end, also, the regularity or irregularity and rate of the respiration should be noted, and if the patient be sufficiently sensible, the capacity of deglutition tested. All these will point towards or against the integrity of function of the nerves about the medulla, and may be useful for diagnosis as well as prognosis.

One word concerning sudden death as a termination in these cases. Of the four times in which it occurred, a clot was found in the fourth ventricle twice; in the third a considerable quantity of blood was collected round the medulla oblongata and pons; and in the fourth no evident cause was present, the apoplexy

being an old one, and in a part of the brain unimportant for the maintenance of life. The subarachnoid fluid was in excess, but it was thought more probable that an epileptic fit had caused death, this having been started by the surface irritation of the old apoplexy. Three of the cases then are adequately accounted for by pressure on the medulla oblongata. But what about the fourth case? It is quite possible that the man may have died in the paroxysm of an epileptic fit, but at the same time, since there is no evidence of this beyond that he was heard to fall by his landlady, and was picked up dead, it is not out of place to accept such an explanation with a proper scepticism, and at least think over other alternatives. In doing so we call to mind at once that patients with chronic brain disease are liable to die in the end suddenly. Cerebral tumours particularly terminate so, and I have seen a similar result in a case of inflammation of the falx cerebri, attended with diffused red softening of the anterior part of the hemispheres, and also in a case of sclerosis of the brain and spinal cord. Why do they die thus? And since they do, it behoves us to look again at the assumed adequate cause of death in the three cases given above where a clot was found in the fourth ventricle; and then we have to acknowledge that the clots in question were not large; that their substance was but soft; and it becomes more difficult than we had supposed it to be to substantiate the correctness of our opinion as to the cause of death. The presence of a clot in a very vital neighbourhood is a help out of the difficulty when it occurs; but in the other cases mentioned there is no such help, and some say sudden effusion at the base has caused death when nothing else can be found, and not even, for the matter of that, the effusion which is assumed to have been so harmful. For my own part, I believe that the suddenness of death is not to be accounted for in many cases by pressure, but is dependent upon a sudden disturbance or arrest of the circulation in the medulla oblongata. Such an arrest may come about in two ways: First, and immediately, by the shock produced by the tear of one of the vessels, and by the consequent contraction of the small vessels. Secondly, and more permanently, by the sudden relaxation of tension, brought about by the rupture and extravasation. To take a familiar illustration: suppose we were injecting the arterial system of a kidney or liver for

microscopical purposes, what chance would there be of making a successful preparation if free leakage occurred at any one spot? Except at some enormous pressure or great waste, there would be but little hope of filling the capillary circulation, save, perhaps, in a few small areas. Under like conditions I conceive sudden death may be brought about in some cases of cerebral hæmorrhage.

In the case of tumours, the fatal arrest of the circulation comes about in a somewhat different way. To begin with, its circulation is already at a disadvantage when there is any tumour inside the skull. What with its own necessities in the way of blood supply, the œdema and thickenings which take place around, and the altered position of the various parts of the brain consequent on its intusion, a tumour will, in all probability, generally create a considerable diminution in the steadiness of the blood stream. Thus patients so affected may be said always to be on the edge of the precipice. Then comes some sudden excitement, trivial it may be apparently to an observer, too small even to estimate or think of, such as sitting up hurriedly in bed; or some exertion brought on by coughing; or the evacuation of the bowels; or numberless other things: but yet sufficient to create a block in the already crowded channels, and the end comes. A minor example occurs to me to illustrate this condition. A patient, whom I have watched for some time, had double optic neuritis and became slowly blind. A partial restoration of sight occurred as the inflammation subsided, and now she has a white optic disc on each side, and very small vessels running over it. What happens? She can see moderately well when perfectly quiet, and can even read and write letters, but if she becomes the least excited in any way, the letters run together, and she is quite incapacitated for work. The explanation of this is probably that the subsiding inflammation of the optic nerves has considerably damaged, as can be seen by the ophthalmoscope, the calibre of the retinal vessels. If the blood flows in them quietly, she manages well enough; if excited, the vessels are blocked, and she loses her sight.

These cases of sudden death are usually attributed to cessation of respiration from pressure on the medulla oblongata; but in the matter of the organ which fails first, I doubt

whether the result is so constant as has been thought. Experiments constantly show that injury to the medulla causes sudden cessation of the respiration, while the heart may continue to beat for some time longer, and this fact alone is therefore strongly in favour of the respiratory system failing first. Still it must be remembered, when watching the clinical features of such cases, that the sympathetic has its centre also in the near neighbourhood of the injury, and the conditions under which sympathetic disturbance may quickly if not suddenly lead to death are only now beginning to be known by the aid of experimental physiology. From what has been ascertained in frogs as to the state of the circulation after destruction of the central vaso-motor ganglia, from what we know occurs in man after injuries to similar parts, and from the empty state of the heart which I have found in some cases of death from hyperpyrexia, I believe it is quite possibly for a fatal issue to come about in some of these cases very rapidly by the withdrawal of blood from the heart and larger vessels, and its being locked up, so to speak, in the peripheral parts. The very interesting state of hyperpyrexia and its much rarer opposite, a much lowered temperature, have also some claim to recognition as causes of some cases of rapid death.

Treatment.—If the reader has managed to extricate the points which the paper is intended to convey, the treatment will suggest itself. In case this should not be so, I venture to recapitulate what it is important to remember in dealing with cases of meningeal hæmorrhage.

1stly. That it is a disease of old age, and as such in a large proportion of cases is associated with renal disease, a large heart, and bad arteries, and that the arterial tension is therefore high.

2ndly. That it also occurs in young people when the heart is enlarged from valvular disease, not infrequently from an aneurism in one of the larger cerebral trunks; occasionally from embolism; occasionally in purpura.

3rdly. That it is a disease which not infrequently is recovered from.

4thly. That the grey matter of the convolutions often gives evidence of considerable deterioration, even in cases which have apparently recovered.

To relieve the high tension which is so prolific a source of cerebral hæmorrhage, no remedy is so effectual as free purgation; and I think there can be no doubt that this means should always be resorted to, both as a means of prevention, which, if carefully guided, may avert the danger of an impending stroke, and which, even when the seizure has come, may yet do much good by lessening the blood pressure, and so avert further bleeding.

From the same point of view it seems to me that venesection is a sound practice, and should be adopted, unless there are any special contraindications which the particular case under treatment may suggest. It is a rapid way of relieving arterial tension, and rapidity is required when a hæmorrhage has occurred, and the pulse still keeps hard and long.

Ice should at the same time be applied to the head, and the head and shoulders should be raised. By so doing the circulation is reduced locally to its quietest, and risk of further bleeding guarded against as much as is possible.

To advocate the use of cold locally might seem rather contradictory to the practice which would be suggested by the remarks I have made on the cause of sudden death in some of these cases; and so it is; but to restrain the extent of the hæmorrhage is so imperative, that any secondary or remote risk must not for the moment be considered.

With regard to the large heart, I should feel disposed, if the other measures were not sufficient, to rely upon the administration of tincture of aconite.

When the extravasation occurs in valvular disease of the heart and in embolism, but little can be done beyond applying the general rules of treatment which are applicable in this or that state of the heart.

When, however, meningeal apoplexy occurs in young people, and an embolism is probable, the possibility of the existence of an aneurism must be remembered, and an effort made to establish or negative its presence. An intracranial aneurism has already been diagnosed during life, so that it is possible in some cases to diagnose one again, and in such a case it might even be necessary to obtain the surgeon's aid, with reference to the possibility of cure or relief by operation.

Lastly, I would lay especial stress on the fact that these

hæmorrhages are probably often present without being suspected ; that they occur from apparently trivial accidents ; and that if care is not exercised, cases which might have perfectly recovered pass on into a state of permanent degeneration of the grey matter of the brain, and even into states of chronic inflammation of the brain and its membranes, thus leading ultimately to confirmed epilepsy, to insanity, and even to death.

It really then becomes most important, after any severe knock on the head, associated with any brain symptoms whatever, but especially where headache is complained of, or if the slightest intellectual impairment is noticed after the injury, that prolonged rest and quiet to the cerebral circulation should be enforced ; and it need hardly be said that this is to be procured not merely by avoidance of much intellectual and bodily exercise, but also by the strictest moderation in eating and drinking.

CASE 1. *Meningeal apoplexy ; mitral stenosis ; granular kidneys.*—Jonathan L—, æt. 62, was admitted, under Dr. Wilks, on October 14th, 1875. He had been a very steady man, without history of syphilis, but was very passionate. His wife had known him to fall down almost insensible from passion, his head and neck looking quite congested. Such an attack seems to have had much to do with the onset of his fatal illness. He had always considered himself a very healthy man till he began to complain, six months ago, of pain at the back of his head and neck, after indulging in violent passion. Soon afterwards his left eyelid dropped, and he dragged the right leg in walking. He was delirious for a short time during two days. He got up and about from this attack and seemed well, but pains in the head returned and his eyelid dropped again. His right leg has dragged ever since, but the arm has been quite strong.

On the day of his admission he went to work, but was taken with pain in the neck and giddiness. Then sitting down he became semicomatose. He was able to recognise his wife, but seemed unable to swallow anything, and he breathed in a very snoring manner when laid on his back. When first admitted the left eyelid was closed, and the pupil of that side

widely dilated. The right pupil was as minutely contracted. He had no evident facial paralysis or altered innervation of the limbs; both arms were flaccid and about equally so, and he moved his limbs about occasionally. He was unable to swallow. Pulse 40, very splashing; the arteries were very rigid at the wrist. He remained much in the same state for about twenty-four hours; the temperature rising to 101.2° ; the pulse to 120; and the respirations to 40. The right eyelid was occasionally convulsed, the eye being continuously rolled inwards and outwards.

The inspection was made by Dr. Fagge. The brain weighed 50 oz. When the dura mater was cut through, the veins on the convex surface were seen to be greatly distended by purple blood. The pia mater also was universally stained. At the base all the parts were buried beneath a thick layer of purple coagulum. This covered the medulla oblongata and pons, the nerves all running through it. The quadilateral space was full of blood, which extended equally along each Sylvian fissure, and round over the whole upper surface of the cerebellum. The arteries were dissected out; they were empty and looked small. No disease or aneurism could be found, and no indication of any rupture.

The lateral ventricle contained a good quantity of dark bloody fluid; and the left one had two thin masses of dark coagulum, one in the posterior cornu, the other spread over the corpus striatum. The third ventricle was empty. The fourth ventricle contained a large diamond-shaped clot.

No trace of antecedent disease could be discovered. The third nerves looked healthy, and so did the central ganglia and the crura cerebri. But of course it is possible that something may have been overlooked, as the parts were obscured by the blood coagulated over them.

Heart $14\frac{1}{2}$ oz.; mitral only admitted two fingers; edges thick.

Kidneys $11\frac{1}{2}$ oz.; surfaces granular and markedly wasted.

No gout in the toe-joints.

CASE 2. *Old meningeal apoplexy; gout; granular kidneys; hypertrophied heart.*—John G—, æt. 38, was admitted, under the care of Dr. Fagge, in December, 1874. His father had died of dropsy and gout, and the patient had been a hard

drinker, a painter by trade, and had had lead-colic and gout, each twice. His symptoms throughout were those of granular kidney. Thus he had the general wasting, with dry and shrunken skin, the intense headache, and the frequent micturition. He had no cerebral symptoms, other than a certain strangeness of manner which ushered in the uræmic convulsions which terminated his life. But it may be noted that his retinæ showed numerous recent hæmorrhages, and also many white atrophic spots due to old hæmorrhage. The first sound of the heart also was reduplicated over the septum, indicative of great arterial tension.

I made the post mortem. The convolutions at the inner part of the right orbital lobe were stained of a chocolate-brown colour, and were soft on section. This appeared to be due to an old meningeal apoplexy. The white matter beneath had softened into a shallow cyst; there was no other disease of the brain. The heart weighed 25 oz.; and the kidneys 8 oz.: the latter were very bad organs.

CASE 3. Erysipelas of head and face; meningeal apoplexy; kidneys rather granular.—John P—, æt. 65, was admitted, under Dr. Wilks, April 24, 1874. Is a porter, and works very hard. Always enjoyed good health till five years ago, when he had dropsy in the feet, legs, and hands. Last summer, whilst walking in the streets he fell down in a fit, was brought home insensible, and so remained for half an hour. When he became conscious he knew nothing about it. Yesterday he had a fit in the street, feeling giddy before falling: he was carried to the hospital insensible.

On admission.—Right eye was closed and swollen, with considerable ecchymosis and some œdema. Urine slightly albuminous. Erysipelas supervened, and he died without brain symptoms, other than dilatation of the pupils and delirium.

I made the post mortem. Pericranium thick and fleshy. Surface of the bone injected. Over the surface of the hemispheres and at various other parts, in all places beneath the arachnoid, was a thin layer of recent black clot. This was of no thickness anywhere, except in the diamond-shaped space at the anterior margin of the pons, where it surrounded the left third nerve and formed a small clot. The greater quantity here than

elsewhere was probably due to gravitation. The membranes were not even stained. The vessels were all sound but atheromatous; still not so much so as is often seen. Dura mater and sinuses healthy. Membranes thick over the anterior surface of the hemispheres, and brain rather wasted. Brain healthy except a number of minute ecchymoses in the substance of the pons and crura. No evidence of brain bruising, and no aneurism, though the arrangement of the clot around a very small branch of the posterior cerebral artery was suspicious of leakage here. Heart 12 oz., healthy. Kidneys 12 oz., rather granular.

CASE 4. *Old meningeal apoplexy; epilepsy; large heart.*—E—, æt. 55, about; brought in dead on October 19th, 1873. Was in Guy's in 1870 for a fit; was bled then and got well. A drinker; was heard to fall by his landlady.

Hair turning grey; cicatrix over middle of forehead two inches in length, of old date; cranial bones thick; brain adherent to the membranes of the orbital plate on the left side; arteries very good; no embolism.

Brain 47 oz., wasted; much subarachnoid fluid.

Left supraorbital convolutions much altered in shape and compressed, so that the frontal lobe on this side was half an inch or more behind the level of that on the right side. The convolutions here were shrunken, and covered by a brown layer of pia mater considerably thickened, and containing pigment as if from old blood extravasation. A section of the surface at this spot showed that the grey colour of the cortical substance of the brain was changed to brown. No evidence of any lymph around. Spinal cord healthy, firm.

Heart 18 oz.; left ventricle thick. Kidneys 13 oz.; very firm, but healthy looking.

CASE 5. *Apoplexy of pons Varolii, and meningeal apoplexy; granular kidneys.*—Esther C—, æt. 36; was admitted, under Dr. Habershon, June 18, and died on June 21, 1873.

Married ten years; moderate beer drinker. Has always enjoyed good health till six months ago. On June 14, morning, she felt giddy, and suddenly fell on her left side. Became insensible in half an hour. Somewhat recovered, and was able to speak in thirty-six hours, and could move her arms and

legs. On admission she was semicomatose. Right arm and leg paralyzed; left can be moved. Right arm flexed and rigid. Right leg not rigid. Pupils contracted; left more than right; the right is sensitive. When asked where she had pain, she put her hand to the left side of her head. Urine, spec. grav. 1022; a little albuminous. 20th. Left arm rigid, but can be moved; left leg straight, but rigid. Temp. 98.8° ; resp. 48; pulse 132; breathing laborious.

Dr. Fagge made the post mortem. Right hemisphere covered with a thin layer of black, half coagulated blood, especially on its convex surface, and towards the base over the posterior lobe; no source for this could be seen, but probably it had exuded from one of the veins entering the longitudinal sinuses. The veins over the surface seemed very large; the blood was free on the smooth surface of the arachnoid. The arteries of the base were healthy. The base was carefully examined for a source of the meningeal apoplexy, but nothing could be discovered, and Dr. Fagge thinks there can be no doubt that the latter arose by an independent rupture during the congestion accompanying the insensibility, resulting from the hæmorrhage into the pons. The pia mater stripped easily: no effusion of blood into its meshes. The left ventricle was decidedly larger than the right, its posterior cornu especially. No trace of disease except in the pons, in which was an apoplexy, the size of a marble, in the extreme anterior part, in fact in the substance of the crura, more on the left side than on the right. Heart weighed $11\frac{1}{2}$ oz., though the left ventricle looked hypertrophied. Kidneys $11\frac{1}{2}$ oz., decidedly granular.

CASE 6. *Meningeal apoplexy; large heart.*—Sarah C—, æt. 35, was admitted under Dr. Rees into Clinical Ward, on October 8th, 1872. She had been taken in a fit two hours before whilst entering a shop. She was stertorous and unconscious; no paralysis was noted; the face was pale.

The post mortem was made by Dr. Fagge, who thus reports:

"The brain, 48 oz., was of a dark purple colour from effused blood. Some of this appeared to be smeared on the surface of the arachnoid, but most of it was beneath that membrane, in the meshes of the pia mater. Over the greater part of the brain the blood was diluted with cerebro-spinal fluid, but

on the right side, in the fissure of Sylvius and its neighbourhood, it formed a rather massive layer of coagulum, dipping down into the folds between the various convolutions. At the base of the brain there was also a good deal of coagulated blood over the pons, extending round the crura into the fourth ventricle. The latter contained a diamond-shaped coagulum. The lateral ventricles had only blood-stained serum, with one or two very small coagula here and there. The brain-substance everywhere seemed quite healthy and free from ecchymosis. The arteries at the base of the brain appeared normal, as well as those in the fissure of Sylvius. No aneurism could be discovered, nor any source of the hæmorrhage, in spite of careful search." Heart $14\frac{1}{2}$ oz. Kidneys 9 oz.

CASE 7. *Gout ; granular kidneys ; thickened membranes ; subarachnoid hæmorrhages.*—James D—, æt. 45, was admitted under Dr. Pavy, on May the 28th, 1872. He was stated not to be a drinker. He had had gonorrhœa, and was laid up with rheumatism sixteen years ago. Nine days ago his foot became hot and swollen. On the 13th he had two epileptiform fits, and the next day he had more of the same kind, and died soon after.

Dr. Fagge made the post mortem. There was marked thickening and opacity of the arachnoid, both at the base and over the convolutions, which were widely separated. Numerous spots of ecchymosis were observed beneath the arachnoid, some in the processes of the pia mater, dipping down between the convolutions. This state existed on both sides. The heart weighed 14 oz., the kidneys only 5 oz.

In this case it seems probable that the fits spoken of in the report were of uræmic origin, and that the capillary hæmorrhages were secondary to the resulting congestion.

CASE 8. *Morbus Brightii ; pericarditis ; meningeal and cerebral apoplexy ; phthisis.*—James H—, æt. 47, was admitted under Dr. Wilks, on November 6th, 1871. He drank hard up to the age of thirty. He was in Guy's in 1868 for severe headache and vomiting, and temporary insensibility, with albuminuria. Since then he has remained well until three weeks ago, when he suffered from severe pain in the legs, dropsy, and albuminous

urine. Had a fit on November 11th, and several afterwards. During and between the fits, which were attended by much twitching of the muscles, he was quite comatose.

Dr. Fagge made the post-mortem. A good deal of blood, apparently diluted with cerebro-spinal fluid, was diffused beneath the arachnoid in many places, especially towards the base and on the right side. Some of that on the left side of the cerebellum was evidently independent of the principal quantity which had diffused itself from the right Sylvian fissure. This fissure was occupied by a round black clot about $\frac{3}{4}$ inch in diameter, which lay partly within the substance of the apex of the middle lobe, partly outside it. The middle cerebral artery ran through it. Heart much hypertrophied. Kidneys 13 oz. ; very diseased. Aorta slightly atheromatous.

CASE 9. *Ulcerative disease of aortic valves ; large spleen ; embolism ; purpura ; diseased kidneys.*—Emma A—, æt. 46, was admitted under Dr. Habershon on July 20th, 1868. She had had rheumatic fever when she was a girl, but had no symptoms referable to brain disease.

Brain 41 oz. Membranes of normal thickness, but with a moderate extent of effusion of blood under them, staining the subarachnoid fluid, and making distinct ecchymoses on the prominence of each middle lobe. Heart $11\frac{1}{4}$ oz. Spleen 20 oz. Liver 70 oz. Kidneys $13\frac{1}{2}$ oz. ; mottled and bad.

CASE 10. *Large white kidney ; chronic phthisis ; general dropsy ; small apoplexies in brain.*—Samuel B—, æt. 34, was admitted August 15th, 1866. Had been ill for a month with dropsy and albuminuria. A month before death he had a fit of convulsions.

Dr. Moxon made the post-mortem. Brain $42\frac{1}{2}$ oz. Vessels quite free from atheroma. Superficial brownish softened patches on the surface, nowhere reaching deeply into the grey matter, but this had lost some of its substance at the spots indicated. The surface of the left corpus striatum was in a similar state. These spots were old hæmorrhages, with quantities of blood pigment in them. Heart 15 oz. Kidneys 16 oz. Atheroma to a slight extent in the aorta.

CASE 11. *Old meningeal apoplexy ; hæmoptysis ; phthisis ; cirrhosis of liver ; granular kidney.*—Thomas F—, æt. 43, was admitted under Dr. Wilks on February 1st, and died February 5th, 1862. A stout flabby man, addicted much to beer and spirits. Was said to have had a fit some weeks ago. He was admitted for hæmoptysis. He had no cerebral symptoms while in the hospital.

The dura mater was found very much thickened over the left temple, for a space the size of the palm of the hand, and gradually bevelling off into the natural membrane. It was about three times the natural thickness. On lifting it up the corresponding surfaces of the arachnoid were found to be of a brownish colour from old effusion of blood. Covering the dura mater arachnoid was a delicate film of lymph of an ochre-yellow colour, which could be stripped off, leaving the serous membrane below healthy. This was probably old effused blood. The corresponding surface of the brain was ochrey. No films on this arachnoid, and no trace of blood found beneath it. The pia mater stripped easily, leaving the grey matter stained in places through its whole depth. Brain healthy. No source for the hæmorrhage could be found.

CASE 12. *Rheumatism ; endocarditis ; infarcta of spleen, kidney, and (?) brain ; aneurism of middle cerebral artery.*¹—Letitia B—, æt. 17, was admitted on January 15th, 1858, and died on January 26th. She was a servant living at Wapping, and came in with hemiplegia and inability to speak, though she appeared conscious. Four months ago she had rheumatism, with swelling of the joints.

On January 1st, not being well, she complained of headache. On the 3rd she suddenly lost the use of her side and speech. She remained much the same till death, when she uttered an exclamation and instantly expired.

She was a spare girl. Nothing was met with till the ventricles were opened, when they were found to contain much blood ; brain structure softened round the blood clot. The base of the brain was covered with clot, as also the medulla oblongata. The larger blood-vessels healthy. The left middle cerebral, as

¹ Reported in Sir W. Gull's paper on "Aneurism of the Cerebral Vessels," 'Guy's Hospital Reports,' ser. iii, vol. v.

it divided into two branches on the under surface of the middle lobe, had an aneurism in the substance of the brain immediately beneath the corpus striatum. It was a round sac about the size of a bean, containing clot, and ruptured by a long irregular fissure. Heart 9 oz.

CASE 13. *Bright's disease ; small granular kidneys ; effusion into arachnoid ; considerable hypertrophy of left ventricle.*—

Richard D—, æt. 32, admitted under Dr. Habershon on February 25th, 1857, and died on March 1st. A very intemperate potman, with health so broken that he had been unfit for work for some three months, during which time he had once been delirious (delirium tremens?). When admitted he was half conscious, could speak when addressed, but gave incoherent answers. He was sallow and wasted. He remained much in the same state, which betokened some important visceral disease. He died with convulsive attacks resembling those of renal disease. The surface of the brain was wasted, the convolutions being much depressed, and an abundance of serum lying in the subarachnoid space. Arachnoid whitish and dull. There was a very remarkable apoplexy on the right hemisphere of the brain. This was lying free in the arachnoid, and covered the anterior lobe. It was a firm clot, weighing an ounce, and spread out in a layer about two inches long. It was quite recent within the last day or two; its source was not traced, although it was no doubt from a vein of the pia mater on the surface. One of these veins was open, but probably from laceration. Heart 14½ oz. Kidneys 5 oz.

CASE 14. *Apoplexy of corpus striatum? Effusion of blood into the ventricles and on the surface of the brain.*—David B—, æt. 57, was admitted under Mr. Cock on October 15th, 1854, in a state of unconsciousness. For many years he had been troubled with frequent micturition and straining, also palpitation and swelling of the legs, for the last five months. A fortnight ago he said he felt his side drawn down so that he could not walk. Work was continued till the afternoon of admission. He fell about eight feet while writing. Being picked up he walked to his desk and collected his papers, and soon passed into complete unconsciousness, from which he did

not rouse. Left side of the head much ecchymosed. No laceration or fracture discovered. During the night he had many convulsive attacks in all his limbs, and the next morning paralysis of the right arm and leg. Urine clear but albuminous.

On admission the case was thought to be one of ingravescant apoplexy from the suddenness of the seizure, the recovery and second loss of consciousness, the total loss of power in all the limbs, and the contracted pupils. After some hours he had many slight convulsive attacks, in which all the limbs and the face moved. These subsided, and then he seemed to have total loss of power on the right side; he moved the left arm and leg on being touched. Eyes moved in all directions. Face straight.

A considerable quantity of blood was under the dura mater (? 2 oz.); it was not coagulated. The pia mater beneath it was intensely congested, particularly at the posterior lobe of the left hemisphere. Blood seemed to exude from the whole of this surface, but no visible breach of vessel could be seen. The left hemisphere was diffuent from blood and broken-up brain substance, the principal focus of the hæmorrhage being the upper surface of the left corpus striatum. Beyond the blood the brain was infiltrated; and had a yellowish hue, which continued into the convolutions. The left ventricle was full of fluid blood and the right full of bloody serum. Fourth ventricle healthy; no blood in it. No congestion at the base; no evidence of old disease. The vessels were not good.

The heart was 13 oz. in weight and the kidneys 13 oz. also. The latter were fatty and degenerating.

It is doubtful in this case whether the convulsions are to be attributed to old renal disease or to an injury received in falling, which had affected the membranes and surface.

CASE 15. Small white granular kidney; diseased spleen(?); very hypertrophied heart; capillary apoplexy of cerebellum and purpura(?).—Joseph O—, æt. 23, was admitted on June 28th, 1854, under Dr. Habershon, and died on the 30th. There is no note of any cerebral symptoms.

The inspection was made by Dr. Fagge. On the lower surface of the right lobe of the cerebellum was a patch of ecchymosis. A section of the cerebellum showed an exudation of blood over all the convolutions following the course of the pia mater,

with bloody points in the white substance. This capillary apoplexy occupied a part of the cerebellum the size of a small egg.

Kidneys small and granular, 7 oz. in weight. Heart 13 oz., with the left ventricle hypertrophied.

CASE 16. Meningeal apoplexy ; granular kidneys.—Joseph B—, æt. 69, was admitted for Bright's disease. He fell into a comatose state and died in three days. Blood was effused beneath the arachnoid, and a large quantity had collected at the base. The third and fourth ventricles contained a small clot. The kidneys were granular, and the aorta very bad ; the cerebral arteries not much affected.

This case has been previously reported and commented on by Dr. Wilks in his article.

CASE 17. Albuminuria ; hæmorrhage on the surface of the brain ; disease of the earbones.—John C—, æt. 4, admitted on June 8th, 1864, under Dr. Pavy. On the right side of the brain at the vertex the pia mater was charged and thickened with extravasated blood, which descended a little into the upper part of the Sylvian fissure. The left lateral sinus was obstructed by an ante-mortem clot, and both earbones were diseased, especially the left.

There is no history of this child, but it seems very probable that the subarachnoid hæmorrhage might have been due quite as much to the thrombosis of the lateral sinus as to the vascular tension which may be assumed to have been present with the albuminuria.

CASE 18. Meningeal apoplexy ; small kidneys.—Mary Anne J—, æt. 67, brought in dead at 1 a.m. on March 29th, 1864. She had come to London, and had been to the theatre with her children, and on returning home she fell, and was immediately brought to the hospital, when she was found to be dead. It was said that her death was instantaneous.

On removing the dura mater blood was seen to be effused over the surface of the brain beneath the arachnoid. It was on the hemispheres, but especially on the sides and the base. In the fissure of Sylvius and about the optic commissure was a coagulum passing in between the convolutions in the course of

the pia mater. A clot filled the fourth ventricle, but had not passed any higher. No source of the blood could be found. No sign of injury. The blood-vessels at the base were much diseased.

Heart small and flabby. Kidneys small, apparently commencing to degenerate.

CASE 19. *Cancer of breast, lymphatic glands, and liver; anæmia; fatty heart; old and recent meningeal apoplexy; indurated spleen; contracted gall-bladder; obliteration of inferior vena cava, with varix of ovarian vein.*—Caroline S—, æt. 59, was admitted under Dr. Moxon on March 24th, 1874, and died on April 17th. Twenty-seven years ago she had rheumatic fever; since then she always had short breath; eighteen years ago had pericarditis; ten years ago had dropsy of the legs and abdomen. She has had epistaxis. On admission the impulse of the heart was diffused, and at apex and base was a systolic murmur. Hæmorrhagic patches in different parts of the body. Urine 1010.

The only symptoms in this case which could have been referable to brain disease were, that during her last illness, lasting for the eight months before her death, she had somewhat persistent vomiting, which did not appear to have any causal relation to the time or matter of her meals. During the last few days of her life she was drowsy, and at times delirious, but without any convulsions.

The dura mater was lined with patches of thin coagulum, most of them circular and of the diameter of a florin. Patches of extravasated blood beneath the arachnoid, most of them recent, but there was a good deal of diffused yellow staining of the membrane, apparently due to hæmatoidin resulting from old hæmorrhage. Brain 39 oz., firm and healthy. Heart 14 oz.; muscle fatty. Kidneys healthy.

CASE 20. *Epileptiform attacks following rheumatic fever; old meningeal apoplexy; phthisis.*—Samuel R—, æt. 18, was admitted under Dr. Taylor's care on February 25th, 1875. One brother had suffered from epilepsy for some years in early life. The patient had had pneumonia seven years before his admission; but except this, appears to have enjoyed good

health till an attack of rheumatic fever in March, 1873. Some time after this he was walking about with a stick, when he fell over a chain and became unconscious; on coming to himself he had lost the use of his left arm and hand, and could not speak. He regained his speech in about a fortnight. This first fit was followed by others, consisting, it is said, merely of loss of consciousness without paralysis or biting of the tongue. He was admitted to the hospital for the first time in September, 1873, for a well-marked attack of rheumatic fever, and it was then noted that he had considerable left facial paralysis and loss of power in his left arm, slight deafness in the left ear, and a systolic bruit at the apex of the heart. He had also at this time several fits, in which the left arm would first begin to twitch; an attempt to restrain it by the other arm resulted in convulsion of both. The lower limbs were next affected in a similar manner, and he became unconscious and bit his tongue. He was in the hospital altogether about six months. On his discharge very little loss of power was noticeable in the left arm as compared with the right, but much numbness of it and the left side of the face. The tongue was protruded to the left side. After leaving he was much troubled with diarrhœa and cough, but had no return of the fits till the day of readmission. He then suddenly fell down, and apparently became unconscious, but no account of his state in the fit could be ascertained; when seen, however, shortly after, he was able to recognise a friend, though unable to speak.

When placed in bed he seemed very drowsy, lying quietly, the eyelids closed, the pupils dilated, but not fixed. The left side of the tongue was still paralysed, *i. e.* it was still protruded to the left, but the right arm and right side of the face were now the most markedly paralysed parts. He had advanced phthisis. The right arm quickly regained very nearly as much power as the left, but his intellectual capacity if anything deteriorated, and his speech was always indistinct. His subsequent symptoms were dilatation of the right pupil and epileptiform fits, in which at one time the left side was the more convulsed, at another both sides equally. His lung troubles gradually became worse, the diarrhœa was very obstinate, and he died on April 20th, seven and a half weeks after his admission, the last note of his condition being that he had been gradually

becoming more and more sleepy, though fairly conscious when he was roused.

Post-mortem.—No sign of injury to the cranial bones. The dura mater was adherent to the surface of the brain, especially over the left hemisphere. On detaching it one found it presenting large patches of a tawny red colour, due to a thin soft film of fibrin on its inner surface, evidently the remains of old effused blood. The brain also presented a number of discolorations, and on cutting into the tissue of the convolutions it was seen that from some of them the grey substance had disappeared to a greater or less extent, from some completely. This condition was not at all unlike the effect of former bruising from injury, but there was none of it at the base; on the other hand, the side of the falx presented the tawny discoloration, and so did the upper surface of the velum interpositum and the ventricular surface of each thalamus slightly, so on the whole it seemed probable that it had resulted from spontaneous meningeal hæmorrhage. Heart $8\frac{1}{2}$ ounces. Kidneys 11 ounces.

CASE 21. *Phthisis; old hæmorrhage into arachnoid cavity and into pelves of kidneys.*—Hannah R—, æt. 20, admitted under Dr. Wilks on May 17th, 1871. She had had symptoms of phthisis for eight months. In the first week in June a purpuric rash with large vibices came out on the right forearm first, then about the thighs; she also had hæmorrhage from the bowels and epistaxis. The bleeding ceased by June 7th, but large vibices came out as late as the 10th on her trunk. On the 11th and 12th she was very delirious for some hours. (Was this due to the subcutaneous hæmorrhage?) This ceased by the 15th, and by the 17th the purpura had disappeared. She sank out and died.

Dr. Fagge made the post-mortem. Over both hemispheres the dura mater was lined by a thin layer of blood almost, but not quite, uniform. This was evidently of some standing, for it formed a membranous layer of some consistence, which could be scraped off and had a faintly yellow colour. The arachnoid over the pia mater had nothing adhering to it, but was slightly discoloured. Heart 9 oz.

CASE 22. *Tubercular phthisis; old meningeal apoplexy.*—

William F—, æt. 53, was admitted under Dr. Habershon on August 26th, 1874. He had enjoyed good health as a young man. Had some illness twelve years ago, but remembers absolutely nothing about it. Ten years ago he was laid up for six weeks, having met with an accident. He is a cabdriver. Liable to bronchitis for the last seven years. Severe dyspnœa for three months. No cerebral symptoms.

The dura mater was stained on its cerebral aspect of a brick-red from old blood pigment; the membranes were thick. Brain 50 oz. On the under surface of the left temporo-sphenoidal lobe was an indentation the size of a florin, the convolutions being of a coffee-brown colour from some old hæmorrhage. The grey matter was of like colour beneath, and the white matter still deeper quite soft. The other parts of the brain were quite healthy. Heart 11 oz. Kidneys 13 oz., looking decidedly bad organs. Surfaces granular and mottled, and section muddled. There was no albumen in the urine.

CASE 23. *Purpura; apoplexy; effusion of blood into serous and mucous membranes and into the areolar tissue.*—William G—, æt. 34, was admitted under Dr. Habershon on June 1st, 1854, and died on June 8th. Healthy looking. Good health till a few days before admission, when he first noticed spots on his ankle. Then the gums became spongy, and epistaxis followed. These symptoms yielded to treatment, but subsequently increased in severity. He became insensible and suddenly hemiplegic on the right side a short time before death; the left side of the body also became paralysed. Convolutions much compressed. There was effusion of blood under the pia mater corresponding to the left temporal bone. Ventricles.—Fluid slightly blood-tinged; more so on left than right side. Posterior cornu of the left side contained blood, and between it and the external surface was an irregular clot of blood and numerous points of ecchymosis. Surrounding brain soft and diffuent.

CASE 24. *Idiopathic anæmia; fatty heart; chronic phthisis.*—George B—, æt. 51, was admitted under Dr. Wilks on June 27th, 1868. Good health till three years ago, when he lost much blood from piles. Ill ten months. Very pale on admission. No positive signs of disease. Urine 1011, pale. No head

symptoms. There were numerous effusions of blood in the subarachnoid space, chiefly on the right side in and near the Sylvian fissure, where some was clotted, firm, and a little changed at the edge. Every aspect of the brain showed many of these patches; they did not penetrate into the brain substance. All the ventricles were free. There was no morbid appearance about the brain except that it was very pale. Heart 11 oz. Muscular tissue fatty.

CASE 25. *Anæmia and general fatty degeneration; atrophy of cranial bones; meningeal apoplexy.*¹—Mary B—, æt. 31, was admitted under Dr. Hughes on March 14th, 1855, and died on the 28th of the same month. Married a year; since then her health has been ailing and she has gradually got weaker. She has had vomiting and diarrhœa. A few months before admission she was in a lunatic asylum, where it was said she often received blows on the head. Calvarium and other parts of the skull thin and light. A large part of the arachnoid surface was spotted with ecchymosed blood, and in some places with larger extravasations; this especially on the dura mater arachnoid, and at the base. All the membranes on the floor were thus spotted, and in the middle fossa on the right side was a free and thin layer of blood between the two serous surfaces. In the anterior fossa on the left side was a similar appearance, a recent very slight effusion on the free surface of the arachnoid producing a delicate film of coagulum. On the visceral arachnoid for a small space over the anterior lobes superiorly was a little ecchymosis. Heart 11 oz., muscle fatty. Kidneys 10 oz., healthy.

CASE 26. *Typhoid fever; capillary apoplexy of brain with inflammation; apoplexy of lungs; ulcers of ileum.*—George W—, æt. 18, was admitted under Dr. Rees on July 5th, 1854, and died on July 12th.

On admission.—Intelligent, though drowsy. Gradually became more drowsy, then comatose. On the 10th the pupils were dilated.

July 11th.—He had twitchings with internal strabismus, and

¹ Reported in Dr. Wilks' paper, loc. cit.

the right eye was more dilated than the left. The coma became more profound, and he died in this condition.

Arachnoid rather opaque ; much venous congestion. Blood effused into left choroid plexus, passing down to the base, and the ecchymosis continued upon the crura. Ecchymosis in the pia mater and on the surface of the pons and crura. Heart 9 oz., left side hypertrophied. Kidneys 8½ oz., congested.

CASE 27. *Death from chloroform ; meningeal apoplexy.*—William B—, æt. 24, admitted on August 24th, 1872, under the care of Mr. Bader. The patient was about to be operated on for some disease of the eye ; he dreaded chloroform, but as he was too restless without, it was administered. He struggled violently under it, but was not restrained. He became blue and the pulse ceased.

The sinuses were full of dark blood. On the surface of both hemispheres, over the central and back parts and near the longitudinal fissure, hæmorrhage had occurred into the substance of the pia mater. Vessels of the pia mater very turgid. Brain 52 oz., otherwise normal. Heart 10½ oz.

CASE 28. *Aneurism of arteria innominata ; capillary apoplexy of the brain ; pneumonia.*—James T—, æt. 53, was admitted under Mr. Forster in 1872. The carotid was compressed under chloroform for ten hours, and when the administration was stopped it was found that he was apoplectic. He remained in a state of stupor till his death, some hours later, occasionally moving the right limbs, but not the left. There was considerable spasm of the left leg. After the cessation of the anæsthesia he was so comatose that artificial respiration and galvanism were resorted to to re-establish respiration. The pupils were equal, but quite insensitive.

Brain 55 oz. ; both hemispheres blood-stained, as if from decomposition, but equally so ; vessels not particularly full on either side. On section patches of hæmorrhage were found scattered through the cineritious substance ; some of these were points scarcely bigger than pins' heads, others were aggregated into masses the size of hazel-nuts, the intervening brain substance being softened. The smaller spots were all in the grey substance, and also probably the larger ones. If anything the left

side was more affected than the right, and the convexity more than the base. Vessels rather thick ; no emboli. Heart 25 oz.

CASE 29. *Softening of the surface of the brain after ecchymosis from injury ; meningeal apoplexy.*—Patrick H—, æt. 40, was admitted under Mr. Birkett in October, 1873. It was stated that he had a fall from a masthead when a boy, rendering him insensible for a fortnight, and since then he had complained from time to time of pain in his head. He was a drunkard, and was brought to the hospital in a state of insensibility at 2.30 a.m., having been found in the street at the foot of a flight of stone steps. He was bleeding from the right ear, but no cerebro-spinal fluid was detected. The pulse was 36 per minute only, the respirations 19, and the pupils small and inactive. He roused somewhat and vomited, but subsequently relapsed into a more complete coma. Some blood was extravasated into the scalp behind the right ear, but no scalp wound or depression of the bone could be found.

The next day he was more sensible, could be made to comprehend some things said to him, and he asked for water to drink. Pulse now 60. No paralysis or convulsion.

October 5th.—Still sleeps much, but can be roused when bawled at. Pulse 52.

7th.—He is more sensible and complains of pain across the fore part of his head. He is able to tell his name and age, but not his address. No paralysis or rigidity. Pulse 56. Very slight pitting of the legs at the ankles. Urine not albuminous. Ice is applied to the head, and he has milk diet. His temperature was always rather below than above normal ; the pulse varied from 48 to 60.

On October 14th he was quite sensible though still drowsy, and he can hardly be said to have been much better than this when he left the hospital. He was able to get up and walk about a month after the accident, but he was still listless and dull, and would answer questions in a dreamy way, as if he hardly apprehended their import.

He appears to have been pretty well from November 12th, when he left, till March 1st, when he became drunk at night.

On the 2nd his face was noticed by his wife to be unlike on the two sides, and he seemed foolish when eating his breakfast.

On the 3rd, in the afternoon, he was found in a fit by a policeman and brought to the hospital. He was admitted under Dr. Pavy in a comatose state, with right facial paralysis and contracted pupils.

On the 5th he still remained in a semi-comatose state and could only be roused with difficulty. Pulse 44; resp. 20; temp. 97·2°. Urine 1030, normal. He asked for the chamber-vessel to relieve himself. He remained much in the same condition; the pupils becoming about normal.

On the 6th, the pulse was 52; resp. 16; temp. 99·2°; he had no paralysis of his extremities.

7th.—More conscious, and answered questions. He was quite deaf with the right ear. He complained much of headache. Sight appeared normal, but the left pupil was rather larger than the right. He was doing well, when on the 18th he fell in getting out of bed, and the next day his speech was impaired. The facial paralysis was very marked, and his arms lay in any position which was given to them. Pulse 60. He then became quite insensible; temp. 100°; pulse 88; resp. 32; and gradually sank without spasm or convulsion.

At the post-mortem no injury to the bones could be discovered, nor were there any osteophytes about their inner surfaces. The inner surface of the dura mater was tawny red over both hemispheres, from old extravasation of blood; that covering the left hemisphere was smooth, but that over the right was in part lined with adherent coagulum, which in some places was of a brownish colour, in others black. Some of it had evidently been extravasated some time before. This was part of a large mass of coagulum which lay between the dura mater and the brain on this side, flattening the brain just as does the clot of blood resulting from a lacerated middle meningeal artery. Some of it was lost, the remainder weighed 8 ounces. The surface of the brain was so discoloured from staining with blood that the amount of old injury was difficult of determination, but it was clearly observable that at many parts of the surface there were pits and small tawny yellow patches, the remains of ecchymosis from injury. This was the case on the inferior surfaces of both anterior lobes, on the summit of the right middle lobe, and particularly towards the back of the lateral surface of the right hemisphere, where there was an

irregular fissure with tawny discoloration of the tissue penetrating down into the white substance. The source of the large effusion of blood could not be made out, but it evidently arose in some way from the rupture of vessels in the softened parts (? in part due to the excitement of the cerebral circulation from alcoholic stimuli). The interior of the brain was healthy, except that the lateral ventricles were dilated, especially the left, which had not been compressed by the clot. The posterior cornu of the left ventricle was very markedly dilated. Kidneys 9 oz., healthy. Heart 11 oz.

CASE 30. *Injury to brain ; meningeal effusion of blood.*—Elizabeth P—, æt. 4, was admitted under Mr. Poland on September 30th, 1864, and died suddenly on October 5th. The child was run over, and its neck was bruised. It soon recovered from the shock, and was going on well until the afternoon of the 5th, when after eating its dinner it suddenly became pale and rapidly died.

A large quantity of blood was effused beneath the arachnoid at the base. This extended downwards around the medulla oblongata and along the spinal cord as far as its termination. It also proceeded upwards to the fourth ventricle, which contained a clot, and to the lateral ventricles, which had in them bloody serum and a small coagulum. The brain was soft, and as it was necessary to remove the coagulum to find a laceration, the vessels were torn, so that any slight breach of surface could not be ascertained. No marked laceration anywhere.

CASE 31. *Meningeal apoplexy and rapid death after a blow ; pulmonary apoplexy.*—James R—, aged about 35, was brought in dead in 1865 ; he was said to have been struck by another man twice on the head.

Slight ecchymosis in the upper part of the right temporal muscle. No fracture of the skull. About the brain in the arachnoid and subarachnoid space was a quantity of blood which had gravitated down to the base. The ependyma of the ventricle was natural, the sub-ependymal arteries fatty here and there. Many small recent extravasations of blood into the lungs.

This case is interesting for two reasons :—First, because it

is an instance of very rapid death from meningeal hæmorrhage, a rather rare occurrence, though by no means unknown; secondly, the state of the lung is worthy of remark. Numerous recent extravasations of blood were found in the parenchyma of the lungs. In meningeal hæmorrhage, and, indeed, in all forms of cerebral hæmorrhage, the lungs are frequently found congested, and where the patients die slowly patches of pulmonary apoplexy are occasionally found, probably the result of the extreme congestion. Hughlings Jackson mentions two such cases.¹ Here the same result seems to have been produced with extreme rapidity. A somewhat similar state of things was also found in Case 26.

CASE 32. *Effusion of blood into the arachnoid, with many internal ecchymoses, from a fall upon the head.*—Stephen A—, æt. 68, was admitted into the eye ward under Mr. Bader on November 6th, 1868. He slipped on the step and fell a short distance, striking his left temple. He was stunned, but recovered consciousness. He afterwards became comatose, but was not paralysed; he had slow breathing and a slow pulse. Pupils could not be observed. An abscess the size of a walnut had been opened over the region of the blow. Bone and dura mater uninjured. Beneath the scalp wound in the arachnoid cavity two ounces of clot were found. Considerable injury to the septum lucidum and the right corpus striatum, with numerous internal ecchymoses.

CASE 33. *Meningeal apoplexy from injury.*—George W—, æt. 23, was admitted under the care of Mr. Birkett in February, 1867. An hour before he had fallen from a height of thirty feet on to the deck of a ship. He was unconscious on admission, with a scalp wound over the right parietal eminence. He had no paralysis, but tetanic rigidity, with tonic convulsion of the face. Two hours later his pulse was noted to be exceedingly irregular, varying from 100 per minute to some number too great to be counted. Respiration also irregular, from 28 to 50. He had a temperature of 103·2°, and was tremulous and convulsed. Eleven and a half hours after the

¹ Russell Reynolds' 'System of Medicine,' vol. ii, p. 525, art. "Cerebral Hæmorrhage."

accident the patient was quite insensible; the pulse was too rapid to be counted; temp. $105\cdot7^{\circ}$; resp. 52; pupils equal, small, and active. He did not vomit. He died five hours later. He had a scalp wound as stated above. The whole surface of the cerebrum had blood in the meshes of the pia mater, and between this and the brain. There was punctiform ecchymosis chiefly about the islands of Reil, the roots of the olfactory nerves, and the right thalamus, the septum lucidum being torn to shreds.

CASE 34. *Meningeal apoplexy; ? injury*.¹—James M—, æt. 46, was admitted under Mr. Hilton on March 26th, 1859. Very intemperate, and during the fits of intoxication he had had severe falls. At 8 p.m. on the evening of admission, after having drunk much, he fell on the kerbstone, and it is stated that he called out before admission.

On admission he was in a state of deep insensibility, as if from drunkenness, but his pupils were unequal and his arms were slightly rigid. He remained breathing stertorously, the eyes directed to the right. The arms fell when raised, but there was no paralysis of any particular part. Urine not albuminous. A scalp wound two inches long on the left temple, but no blood effused beneath it. Skull uninjured, and surface of dura mater healthy. A large quantity of blood effused beneath the dura mater, the whole side of the brain down to the base being covered, but more above than below; quantity about two ounces. No breach of structure beneath, but two very slight discolorations as if from a bruise. The dura mater was also examined, and no rupture of the meningeal vessels was discovered, but from there being more blood in the neighbourhood of the longitudinal sinus it was probable that some vein leading into it had been torn. The membrane was necessarily torn in order to examine it more carefully. It was tolerably clear that some of the superficial cerebral vessels had given way, for none of the meningeal ones were found injured. The arteries were very diseased. Heart 11 oz.

CASE 35. *Effusion of blood into the arachnoid cavity from injury*.—Arthur G—, æt. 18, a trunkmaker, living at New Cross, was admitted under Dr. Barlow on July 17th, 1856. Very

¹ Reported in Dr. Wilks' paper, loc. cit.

little history, but he had been fighting in a barge on the 6th and then received a blow on the head. He did not suffer much in consequence, and continued his employment. Finding that his head became worse he came to the hospital. He walked up to the ward and seemed quite rational. His only complaint was pain in the back of the head, but he had considerable pyrexia, and was evidently very ill. Without any fresh symptoms being observed by the nurse he died in the course of the night.

No fracture of any of the bones. In the arachnoid cavity on the right side blood, both fluid and semi-coagulated, was collected to the amount of $\frac{3}{4}$ iv. It was distinctly brown, showing it to be of at least some days' date, and the greater part was in the region of the middle meningeal artery. The vessels were all carefully examined and found healthy. The right surface of the arachnoid had exudation matter on it. Pons, right side flattened.

CASE 36. Concussion of brain ; capillary apoplexy ; inflammation of membranes ; ventricular effusion ; aortic disease ; pneumonia.—William C—, æt. 56, was admitted under Mr. Hilton on March 22nd and died March 25th, 1854. Fell from a height on his head. On admission he was quite insensible; breathing stertorous; the pupils slightly sensible and moderately dilated. On the following day there was some reaction, but he was not sensible.

23rd.—Rolling of the eyes slightly; pulse labouring and full, about 100; he died comatose.

No fracture; dura mater congested; a small clot in the tissue of the dura mater, with subarachnoid effusion and extravasated blood beneath the dura mater on both sides; blood was also extravasated into the white fibres on both sides; fornix soft; ventricles full of clear fluid.

The remainder of the cases included in the table were appended from already published records in the 'Pathological Society's Transactions,' and are therefore omitted here.

ON THE CAUSES OF PREVENTABLE BLINDNESS.

By C. HIGGENS.

THE object of the present paper is to call attention to certain affections of the eyeball or its appendages, which, if proper precautions be taken, may leave no bad results, but which, if neglected or improperly treated, will lead to more or less impairment of function.

The affections to be considered may, with propriety, be called the causes of "preventable blindness," although in many cases the loss of sight may be only partial. In many instances the damage to vision arises from negligence on the part of the patient or of those who have the care of him; but in not a few from want of knowledge on the part of the medical attendant. We will first consider some diseases of the conjunctiva, viz. granular and purulent ophthalmia. Secondly, certain morbid processes affecting the deeper structures of the globe, viz. glaucoma and sympathetic ophthalmia. Thirdly, some miscellaneous affections, *e. g.* damage to the cornea from exposure, high degrees of myopia, some cases of optic neuritis, &c., all of which may be causes of permanent damage to vision which might be avoided by early and proper treatment.

Granular Ophthalmia.

A few remarks on the anatomy of the conjunctiva may aid in a right understanding of the morbid changes met with in granular ophthalmia. Its structure is similar to that of other mucous membranes; the epithelium is, for the most part, of the squamous variety, but in the fornix the superficial layers are found to be columnar, whilst the deeper ones are spheroidal. The substance of the membrane is made up chiefly of loose connective tissue, with many branched cells, which form a plexus; it is rich in cæcal and racemose glands, and in it are also found a number of peculiar closed follicles, known as "trachoma glands." These trachoma glands are surrounded by a plexus of blood-vessels, and under normal conditions are invisible to the naked eye; they appear, however, to play a very important part in the production of granular ophthalmia. The surface of the conjunctiva, more especially that of its palpebral portion, is covered by numerous papillæ, which may often be found somewhat hypertrophied, giving the inner surface of the lid a velvety appearance. A diseased condition of these papillæ helps to make up the sum of granular ophthalmia.

Granular ophthalmia affects principally the lower classes, and is often very prevalent where large numbers of persons are crowded together in workhouses, schools, barracks, &c. The causes of the disease are not altogether plain, but it would appear that in persons who have lived for some considerable time under unfavorable hygienic conditions, a peculiar granular state of the palpebral conjunctiva becomes developed. Persons thus affected are said to be predisposed to granular ophthalmia. The predisposed eyelid is characterised by the existence of small, pale, more or less spherical bodies situated in the structure of the conjunctiva; these little bodies much resemble, and are known as, sago grains. They will be found best developed and most constantly present on the inner surface of the lower lid, near the outer canthus. They may, however, be scattered over the whole surface of both the

lower and upper lids, but are always most abundant in the position indicated.

The sago grains are said to be the result of morbid changes in the closed follicles (trachoma glands) already alluded to; they are sometimes described as follicular granulations. The conditions which appear to favour the production of the pre-disposed lid are, bad living, damp, rapid variation of temperature, over-crowding, bad ventilation, want of cleanliness, &c. Race is also said to have some influence, and certainly amongst our out-patients we find that a very large proportion of cases of granular ophthalmia occur among the Irish. In Ireland the disease is very common; granular ophthalmia is also very prevalent in the East among the Arabs and Egyptians, and is sometimes spoken of as "Egyptian ophthalmia."

This predisposed or granular condition of the eyelids once developed may remain stationary for an unlimited time, without giving rise to the least inconvenience, and without the person affected being conscious of its existence; but, on the other hand, attacks of inflammation of the conjunctiva, accompanied by the production of muco-purulent or purulent discharge, are very liable to be set up by slight causes, such as irritation from dust, dirt, cold wind, too much glare, &c.; or may follow upon acute diseases, as measles or influenza. When any kind of discharge from the conjunctiva exists, granular ophthalmia may spread rapidly by contagion. Contagion does not, however, play such an important part in the spread of the disease as might be expected; neither will the discharge from a case of granular ophthalmia produce the same disease if inoculated on a previously healthy conjunctiva; it may produce severe catarrhal or purulent ophthalmia, but not the granular form. Before the latter can be produced, either by contagion or otherwise, it is necessary that the pre-disposed granular condition of the conjunctiva be present. This should be borne in mind, as it shows that granular ophthalmia must of necessity be the outcome of a chronic change which, as previously stated, is probably the result of bad hygienic conditions, and which may take a year or more of life under such conditions for its development.

In the cases of granular ophthalmia met with in hospital practice, more or less active inflammation is present; the

simply predisposed lid is not seen unless looked for, as it gives rise to no symptoms, and consequently no complaint is made. Patients suffering from active granular ophthalmia usually complain of smarting burning pain, a sensation as if grit were in the eyes, and often some dimness of vision. There is more or less muco-purulent or purulent discharge, and very likely more or less severe intolerance of light. The caruncle and semilunar fold are red and swollen; the lids themselves may appear somewhat red and puffed, and sometimes drooping, giving the patient a bashful appearance; but it is in the palpebral conjunctiva that the most marked changes are met with.

There are three principal forms of granular ophthalmia which may be distinguished by the nature of the granulation present. One is characterised by the predominance of the sago grains previously alluded to, around which inflammation has been set up. The conjunctiva covering both lids is red, swollen, and thickly studded with the little greyish-white masses; these are usually most plentiful on the lower lid, but a considerable number may be met with on the upper one, especially along the convexity caused by the edge of the tarsal cartilage, on eversion of the lid. This form may be described as follicular, and is very commonly met with in pauper schools, workhouses, and barracks. Another variety which is usually accompanied by severe inflammation is characterised by the predominance of hypertrophied papillæ by which the sago grains, if they exist, are obscured. In this variety the palpebral conjunctiva, especially that of the upper lid, is villous, extremely vascular, and rough, presenting somewhat the appearance of coarse sand-paper coloured red; it may be described as papillary; it is not so common as the follicular variety, but occurs under very similar circumstances. Besides these two varieties of granular ophthalmia a third is met with, consisting of a combination of the follicular and papillary; it is known as mixed granular ophthalmia. The mixed form is much the most severe of the three. On examination the inner surface of the lids is found rough, red, swollen, and thickly covered with hypertrophied papillæ and sago grains, the latter having, in some cases, run together and given rise to a grey, somewhat gelatinous, swelling of the conjunctiva. In some cases the surface of the lid may be found raised into

ridges separated by deep furrows. The swelling and roughness are always most marked along the convex border of the everted tarsal cartilage of the upper lid. It is this variety of granular ophthalmia that is usually met with in hospital practice; the two first forms come most frequently under the notice of poor-law medical officers and army surgeons. Either the follicular or papillary granulations may, if neglected or improperly treated, in time, develop into the mixed variety.

Results of granular ophthalmia.—The disease is most obstinate, but in many cases will yield at length to treatment, no signs of its previous existence remaining behind. In some cases of very old standing, spontaneous recovery has taken place, the conjunctivæ being left smooth, but more or less scarred.

More or less destruction of tissue may take place; the surface of the lids, more especially that of the upper ones, is often found marked by cicatrices, more or less linear and puckered; or the greater part of the palpebral conjunctiva may have become converted into fairly smooth cicatricial tissue. The conjunctiva may be much shrunken, the fold between the globe and lid (fornix) being more or less shortened. In some cases, on drawing the lower lid away from the globe, a few tendinous bands make their appearance, stretching across from the lid to the eyeball, and some difficulty may be experienced in everting the upper lid. The whole sulcus may be more shallow than usual, and in extreme cases quite obliterated. In a case of old granular ophthalmia which was under my treatment about a year ago the conjunctiva was shrunken to such an extent that the palpebral aperture was much narrowed, and the edge of the lower lid in each eye drawn firmly into contact with the globe, no separation whatever existing between them. As a consequence of the destruction of conjunctiva, its secretion is much diminished, the condition of dryness and harshness known as xerophthalmia is developed; the cornea is not properly moistened and cleansed, and suffers in consequence. On the other hand, epiphora may occur from occlusion of the tear puncta, or the tarsal cartilages may become distorted, giving rise to inversion of the lid (entropion).

The palpebral aperture may be diminished to a greater or

less extent, or an abnormal direction of some of the eye-lashes (trichiasis) may occur. This destruction of conjunctiva may result from the granular disease alone, but in many cases unskilful treatment has much to answer for. The worst cases I have seen have come from India or Australia, and have been treated by strong caustics. The great source of danger to vision in granular ophthalmia arises from implication of the cornea. This structure is often early affected. It becomes opaque and vascular, from the deposit of inflammatory material beneath its epithelium, and the development of a number of superficial blood-vessels. This condition is known as "pannus," and is brought about by the constant irritation of the corneal surface by the roughened lid; it may also be produced by irritation from inverted lashes or foreign bodies: pannus is always most dense at the upper part of the cornea. The origin and course of the newly developed vessels should be noticed; it will be found that they are continuous with those of the conjunctiva passing over the corneal margin. When this kind of vascularity occurs, we may be pretty sure that the cornea is being irritated, and should at once look for the cause. In some cases of ulceration of the cornea, vessels may be seen running from the conjunctiva to the ulcer; such cases will, however, be recognised at once.

In the vascularity of corneitis arising from other causes than friction, we always find that the vessels commence at the margin of the cornea and lie wholly in it, having no visible communication with those of the conjunctiva. It is of great importance that pannus should not be confounded with other forms of corneitis, as its treatment differs widely.

A moderate amount of pannus does no harm, and will get well as the granulations are cured; it may even be beneficial, as it acts as a shield to the cornea, protects it from further irritation, and may prevent destructive ulceration. Dense pannus always leaves marks behind it in the form of more or less dense opacities of the cornea and irregularity of its curvature. At any time during the course of granular ophthalmia the cornea may become superficially or deeply ulcerated, as a result of which irregular transparent facets may form on its surface, or permanent opacity be caused. Perforation may take place allowing of prolapse of the iris, in which case an

opacity complicated by anterior synechia is produced, or should the perforation be large a bulge or hernial protrusion of the iris (staphyloma) may result. A still more serious form of damage, which is very liable to occur if the granulations be associated with purulent discharge, is sloughing of a considerable portion of the cornea, followed by a large staphyloma, or even by escape of the lens and some of the vitreous, and subsequent atrophy of the globe.

In some cases the curvature of the cornea may be altered, so that it becomes more convex, giving rise to myopia in a previously emmetropic eye.

Iritis sometimes occurs in the course of granular ophthalmia, and may give rise to permanent impairment of vision, by causing opacity of the lens, capsule, closure of the pupil, extensive posterior synechiæ, &c.

Any of these causes of impairment of sight may arise during the progress of granular ophthalmia, or may be brought about later on by its sequelæ, xerophthalmia, entropion, trichiasis, &c.

Having seen that granular ophthalmia alone or aided by unskilful treatment may cause more or less impairment of sight, let us now consider how loss of vision may best be guarded against?

Granular ophthalmia will occur in spite of all our care, and in many cases more or less damage to sight will be done in spite of treatment. Nevertheless there are, at the present time, many persons going about partially or totally blind from its effects, who might still be enjoying useful vision had proper measures been taken at a suitable time. I constantly see cases in which the conjunctiva is more or less scarred and shrunken, the cornea damaged to a greater or less extent, and perhaps one or other eye entirely lost, and all from a disease which is to a great extent "preventable," and which, even when established, would seldom lead to such disastrous results unless neglected or improperly treated.

In order to reduce to a minimum the number of cases of loss of sight from granular ophthalmia, we have, first of all, to consider how its occurrence and spread may be prevented; secondly, what is the best plan of treatment of the disease itself and of its sequelæ.

The subject of prevention of granular ophthalmia amongst communities has occupied much attention. Of late years the disease has been so prevalent in the metropolitan pauper schools as to constitute a regular curse.

One of these schools (the South London, which accommodates about 1500 children) I inspected some months since. It appears that, although some children are admitted with granular lids, or suffering from granular ophthalmia, a very great number acquire the disease after 'some months' residence in the schools, so that it would seem that the conditions under which the inmates are placed in these institutions favour the development of granular ophthalmia.

The result of my inspection was, that I found about 58 per cent. of the children had markedly predisposed lids, or were suffering from granular ophthalmia in a more or less active state,¹ and in 9 per cent. the cornea of one or both eyes had sustained more or less damage. The conditions which favour the development of the predisposed lid have been already enumerated (p. 181); its occurrence in numerous individuals of a community certainly indicates a low standard of health and the existence of depressing hygienic conditions. In order to prevent its further development we must, speaking broadly, take measures to improve the physical condition of the members of the community amongst whom it has made its appearance.

We should see that proper food and clothing are given, that there is sufficient cubic space in dormitories, wards and dayrooms, that ample washing accommodation is provided, and the greatest cleanliness observed; that there is proper ventilation, drainage, &c., and that plenty of time is allowed and space provided for out-door exercise. We must also take measures to prevent the occurrence of inflammatory attacks, or the production of granular ophthalmia, as we see it in hospital practice. With this object in view we should avoid all sources of irritation, as dust, dirt, cold winds, draught, too bright light, &c. And lastly, we must take care that all persons with discharge from the conjunctiva are isolated from the rest of the community, so as to avoid as much as possible whatever danger there may be from con-

¹ By active state is meant that some inflammatory action, accompanied by pain, is going on.

tagion. The foregoing remarks include only general principles, and I shall make no attempt to enter into details.¹

In the treatment of granular ophthalmia our object must be to cause the removal of the granulations, and to prevent the formation of new tissue, *without destruction of the conjunctiva.*

The disease is essentially chronic ; many cases remain under treatment for years. In such the granulation can be kept down by constant applications, and may after a time disappear entirely, but if neglected will certainly get worse.

Two cases, selected from a large number at present attending amongst my out-patients, may serve to illustrate the extremely chronic and obstinate nature of the disease.

Both the patients are young Irish women, and both have been under treatment in the hospital and as out-patients for nearly three years ; they attend, as a rule, regularly twice a week, and on each occasion the lids are thoroughly brushed over with greenstone, or the mitigated nitrate of silver stick ; in the intervals they use sulphate of copper drops three times a day. So long as they attend regularly a gradual improvement takes place, until the lids become almost smooth ; they then cease to attend, but are sure to make their appearance in the course of a few weeks as bad as ever. How long this state of things will continue I do not know, but have not yet despaired of effecting a cure. I am quite certain that if these cases are neglected some serious corneal damage will occur ; as yet no shrinking of the conjunctiva has taken place, nor, beyond slight pannus, is there any opacity of the corneæ.

The remedies which have been found most useful are astringents and mild caustics. Strong caustics should never be employed ; it is easy to get rid of the granulations by their use, but the conjunctiva is also destroyed, and is replaced by dense cicatricial tissue, which by its contraction causes the shrinking of the conjunctiva, and other evils already mentioned (p. 183). The worst examples of entropion, symblepharon, narrowing of the palpebral aperture, &c., that have come under my notice (with the exception of those caused by burns), have been in old cases of granular ophthalmia, which had been treated by solid nitrate of silver. The treatment of

¹ The subject of ophthalmia in the pauper schools has been most ably discussed by Mr. Edward Nettlehip in a report to the Local Government Board.

granular ophthalmia adopted amongst our out-patients is as follows:—In the more recent cases the palpebral conjunctiva is twice a week touched lightly all over with the mitigated nitrate of silver stick (one part of nitrate of silver to three of nitrate of potash); after the application the conjunctiva is washed with a solution of salt and water. In the more chronic cases the green-stone (*lapis divinus*) is used instead of the nitrate of silver.

In most cases sulphate of copper drops (*Cupri Sulph.*, gr. ij, *Aquæ* ℥j) are ordered to be dropped into the eyes three times a day or oftener. If there be much intolerance of light or symptoms of iritis exist, gr. $\frac{1}{2}$ or gr. j of sulphate of atropine is added to each ounce of the sulphate of copper drops.

If there be copious purulent discharge alum lotion (gr. x to ℥j) is ordered in lieu of the sulphate of copper drops.

If extensive ulceration of the cornea exist the eye is ordered to be kept bandaged with lint soaked in belladonna lotion, and a fomentation of belladonna, or poppies, to be used at intervals; the granulations are neglected until the more severe symptoms have subsided.

In some severe cases inoculation with pus from a case of purulent ophthalmia is performed, but such cases are always treated as in-patients.

Inoculation is only applicable to cases in which there is dense pannus; if the cornea be healthy, or only slightly affected, it is very liable to slough during the course of the induced purulent ophthalmia.

Inoculation is best performed by simply transferring some of the pus from a recent case of ophthalmia neonatorum to the conjunctiva of the person whom it is desired to inoculate. Purulent ophthalmia usually sets in in the course of twenty-four or thirty-six hours, and may be left to run its course without treatment. The granulations always disappear, and the cornea clears gradually, improvement often going on for three or four years after inoculation has been practised. If it is deemed advisable to inoculate in a case where one eye is healthy, the greatest care must be taken to shield the sound from contact of discharge.

The treatment of granular ophthalmia, especially amongst hospital out-patients, is most unsatisfactory. Some cases are permanently cured, many get better and then cease to

attend, returning in a few weeks or months as bad as ever; others again continue under treatment for months and years, all our efforts only serving to keep the disease in check. Even this, however, is doing a good deal, for such cases without treatment, or if treated improperly, will go on from bad to worse, and eventually lose all useful vision; we must, therefore, persevere with our treatment in spite of the want of success attending it. In some cases I have seen a cure effected after two or three years or more of constant treatment; a favorable change takes place almost suddenly, the granulations begin to disappear, and are replaced by smooth shining tissue, which can hardly be looked upon as healthy conjunctiva, but nevertheless forms a very efficient substitute. The following case is a good instance of such a recovery.

A soldier, who had contracted granular ophthalmia in India, some years before, came under my care in 1870 at the Central London Ophthalmic Hospital. He had been treated off and on during the whole time that his eyes had been affected, and with the exception of inoculation had had almost every known remedy tried. When I first saw him the palpebral conjunctiva, especially that lining the upper lids, was infiltrated, swollen, and covered with large rough vascular granulations, consisting principally of masses of hypertrophied papillæ, separated by deep sulci; both corneæ were covered by dense pannus; he could hardly see to go about.

I treated him for about three years without apparent result; but at the end of that time a change took place, the granulations rapidly disappeared, the swelling and vascularity subsided, the pannus gradually wore away, and at the end of a comparatively short time all that was left of the disease was some scarring of the surface of the lids, slight shallowing of the sulcus between the lids and globe, and slight opacity of the cornea.

During the time this patient was under my care he was treated with every kind of astringent lotion,—applications of greenstone, mitigated nitrate of silver stick, solutions of the salt of strengths varying from ten to forty grains to the ounce of water, dusting of calomel and quinine into the eyes, constant poultices; in short, everything was tried except inoculation.

At the time recovery commenced he was having a solution,

gr. xx to 3j , of nitrate of silver applied daily, which treatment was continued until all trace of granulations had disappeared.

The treatment of the sequelæ of granular ophthalmia is entirely operative, and would take too much space to be entered into here; suffice it to say that our object must be to protect the cornea, when exposed, and to guard it from irritation by the removal of foreign bodies, cure of entropion, &c. And in cases where a permanent opacity has formed in front of the pupil a new one must be made behind a transparent portion of cornea.

Purulent Ophthalmia.

Purulent ophthalmia, more especially that form of the disease met with in newly born children (ophthalmia neonatorum), is a very frequent cause of loss of sight.

Amongst hospital out-patients we often see children in whom the positions of the corneæ are occupied by dead white globular staphylomata, vision being reduced to perception of light. This condition is usually brought about by destruction of the cornea from extensive ulceration or wholesale sloughing during the course of purulent ophthalmia. The projection (or staphyloma) is formed by the iris, which has pressed forward into the opening left by destruction of the cornea, subsequently become coated with lymph, and at length formed a more or less dense cicatrix.

I have no hesitation in saying that this state of things might in many cases be prevented. Besides the extreme cases just mentioned, we may find vision impaired by corneal opacities, opacities on the lens capsule, corneal opacity with anterior synechia, or small staphylomata, all arising from the same cause; these, however, are not so important, as the loss of sight is only partial, and very good vision may be obtained by operation.

The causes of ophthalmia neonatorum are, contact of acrid vaginal secretions during parturition, want of cleanliness after birth, or a combination of the two, assisted by bad air and bad living. The secretion of all others most certain to cause purulent ophthalmia, and that in its severest form, is gonorrhœal matter; but leucorrhœal discharge, or even the

irritation of dust and dirt after birth, without contact of abnormal secretion, may cause the disease.

I may here correct what appears to be a very common error, viz. to suppose that all purulent ophthalmia is caused by contact of gonorrhœal matter. Such is not the case, and by far the greater number of cases arising either in the newly born or in older persons owe their origin to other causes. Gonorrhœal ophthalmia is purulent, but purulent ophthalmia is not necessarily gonorrhœal.

The symptoms of ophthalmia neonatorum are obvious enough; the lids are swollen, dusky red in colour, and there is copious yellow discharge issuing from between them, which may escape in gushes on an attempt being made to open the eyes. As previously stated, the great danger to sight is from ulceration or sloughing of the cornea, either of which—if proper treatment be early adopted—should occur but rarely. In many cases the disastrous results of ophthalmia neonatorum are due to neglect on the part of nurses or mothers, who take no particular notice of the state of the child's eyes until the discharge has become very profuse. Advice is then sought, and very probably the cornea is found opaque, deeply ulcerated, sloughing or suppurating, or very possibly perforation may have already taken place. Occasionally part of the contents of the globe have escaped; it has happened to me on two occasions to have the crystalline lens brought in a piece of paper, with the report that the nurse thought the sight had come out.

In other cases again, the medical attendant is to blame; his attention is called to the condition of the infant's eyes, but he looks upon it as a trivial matter, prescribes warm water, and perhaps does not see the child again for two or three days; by this time, however, there is no mistaking the nature of the disease, and very probably permanent damage has been done to the cornea.

Again, when the nature of the disease has been indicated, and a plan of treatment prescribed, the attendants cannot be persuaded to carry it out thoroughly, and the child is allowed to go blind simply from wilful neglect on the part of its nurse or mother.

In some cases, however, the inflammation is so violent

from the first that damage will be done to the cornea in spite of treatment early commenced and carefully carried out; but such severe examples are rarely met with.

The following cases illustrate very well how ophthalmia neonatorum may be neglected.

CASE 1.—Ada S—, æt. 2 months. Both eyes, cornea perforated; large white staphylomata; clear cornea around base of staphyloma in each eye; severe discharge came on two days after birth; some lotion was ordered to be used *twice a day*, no other treatment.

CASE 2.—John W—, æt. 3 years. Mother first noticed discharge from child's eyes three days after birth, took no notice of it for five weeks, then took the child to Moorfields; was told that it was quite blind. Both eyes are staphylomatous; there is perception of light.

With the exception of cases in which one eye only is affected the medical attendant has little chance of preventing the occurrence of ophthalmia neonatorum. In such he may prevent the sound eye from becoming inoculated, by carefully covering it with a pad and strapping. The treatment of the disease also (as far as hospital practice is concerned) must be left pretty much in the hands of nurses or mothers. When the child is first seen all discharge should be carefully washed away, and the condition of the cornea carefully ascertained; should this structure be normal the prognosis is favorable. If it is only hazy no permanent damage need result, but if there be deep or extensive ulceration, sloughing, or perforation, more or less impairment of vision or total blindness will result. The examination of the cornea must be made with the greatest care; should any violence be used, and ulceration or sloughing have already taken place, rupture may occur. If the cornea be found healthy we must impress upon the nurse or mother that the ultimate fate of the child's eyes depends entirely upon the care with which the treatment prescribed is carried out. If it be hazy, ulcerated, sloughing, or perforated, we must give a prognosis according to the amount of damage done, but must insist on the same care in carrying out treatment.

The treatment I prescribe in cases of ophthalmia neonatorum is simply the use of alum lotion (gr. vj to 3j), every hour or half hour—according to the amount of discharge—from 8 a.m. to 8 p.m., and during the night when the child is awake, but it need not be roused purposely. The lotion must be used thus frequently until the quantity of discharge has sensibly diminished ; after which it may be applied at longer and longer intervals until the discharge ceases entirely.

In cases where deep ulceration or perforation has taken place, I order the eye to be bandaged with lint soaked in belladonna lotion, the bandage to be frequently removed in order to apply the alum lotion. The alum lotion can be used with a syringe, or poured into the eye directly from the bottle, but care must be taken that the lotion goes well between the lids and does not simply flow over the child's face.

If the eyelids become gummed together during sleep some simple ointment may be smeared on the edges of the lids. Some surgeons employ caustics, but I think they are unnecessary.

Purulent ophthalmia when attacking older persons may originate without apparent cause. Occasionally, very severe outbreaks occur—in schools—amongst children in whom the lids are already granular. The disease may spread rapidly, attacking the attendants and others whose lids are not granular. The character of the ophthalmia during such outbreaks is often extremely severe, and in some cases irreparable damage may be done to sight.

I have lately had under treatment two nurses from one of the metropolitan pauper schools ; both became affected by purulent ophthalmia during a very severe outbreak which occurred in the school some eighteen months ago. In one the left eye was staphylomatous and painful, but still had perception of light ; it was excised. In the other the left eye was destroyed ; abscission was performed ; the cornea of the right eye also had been perforated, and there was an opacity with anterior synechia, but very good vision was obtained after iridectomy.

Both these cases were skilfully and energetically treated from the first by the medical officer of the school, but nevertheless very severe damage resulted.

Several other eyes sustained more or less damage during this outbreak, but the two mentioned were the most severe cases and show how destructive to sight the disease may be, and how important it is to prevent its occurrence.

Purulent ophthalmia when once started in a school or other institution very probably spreads by contagion but in some cases it is hard to see how, and it would appear that some other cause is in operation.

To prevent the occurrence of such outbreaks, and also to limit as much as possible the spread of the disease, and guard against the loss of sight consequent thereon, the same measures should be taken as detailed under granular ophthalmia, pp. 186-9.

There is nothing characteristic about the commencement of an attack of purulent ophthalmia; it may follow what at first appears to be simple catarrhal inflammation, and indeed catarrhal and purulent ophthalmia seem to merge almost insensibly into each other; a severe attack of the former often much resembling a mild form of the latter, and *vice versa*.

The milder forms of purulent ophthalmia, however, do not come among the "causes of preventable blindness," as they do not cause corneal damage. The more severe forms of purulent ophthalmia usually commence with pain, intolerance of light, increased vascularity of the conjunctiva, and watering of the eye, all of which symptoms, however, are merely those of inflammation, and may arise from injury, or may indicate the presence of a foreign body, or be the forerunners of an attack of iritis, corneitis, &c. But should the patient have been exposed to sources of contagion these symptoms should place us on our guard.

Very shortly—if the case be one of purulent ophthalmia—the conjunctiva begins to swell, and in the course of twelve or twenty-four hours the nature of the disease is manifested by the appearance of purulent discharge.

Purulent ophthalmia seldom attacks both eyes simultaneously; the second eye is very usually inoculated from that first affected.

Hospital patients usually present themselves for treatment when the disease is at its height in one eye, and very probably commenced in the other.

The appearances are the following :—Eyelids more or less swollen, bluish-red in colour ; conjunctiva, both palpebral and ocular, swollen, bright red, and secreting pus more or less profusely. There may be a good deal of pain, and the patient is often much depressed at the prospect of loss of sight.

The form of purulent ophthalmia produced by inoculation with gonorrhœal pus (gonorrhœal ophthalmia) is the most severe ; it differs from ordinary purulent ophthalmia more in degree than in kind, but such is its severity that a case seen at the height of the disease can be immediately recognised.

The eyelids are enormously swollen, dusky red in colour, and the upper one often overlaps the lower to a considerable extent.

The conjunctiva is dark red, and so swollen that the fornix is pushed out between the lids ; there is very great swelling of the ocular conjunctiva (chemosis), so that the cornea appears to be buried in the infiltrated tissue ; there is profuse yellow discharge, much pain, considerable constitutional disturbance, and as a rule the patient is found either to be suffering from gonorrhœa, or to have been exposed to risk of inoculation by gonorrhœal discharge or pus from a like case of ophthalmia.

It is hard to understand how a disease presenting such marked symptoms as gonorrhœal ophthalmia can be mistaken, but that such errors do occur the following case will show :

Elizabeth S—, æt. 21, attended amongst the out-patients, January 5th, 1875. The eyelids of the right eye were greatly swollen, the upper overlapping the lower to a considerable extent ; the fornix protruded between the lids, there was much difficulty in obtaining a view of the cornea, which, however, was found to be healthy ; there was profuse yellow discharge and a good deal of pain. The left eye was unaffected.

The history the girl gave was that she had been kicked on the eye some days previously. She and her mother, who accompanied her, both denied most indignantly that there was any chance of inoculation ; however, upon examination, she was found to be suffering from a most profuse gonorrhœal discharge, had a large sore on each labium, and a bubo in each groin.

The whole of the conjunctiva was thoroughly cauterised with solid nitrate of silver, and afterwards washed with salt and water; alum lotion (gr. x to ʒj) was ordered to be used constantly. The sound eye was carefully bandaged, and two grains of quinine were ordered to be taken three times a day.

January 9th was much better.

January 23rd.—The discharge had almost disappeared, but the upper lid was swollen and drooped, and could not be raised.

Some weeks later there was still some swelling of the upper lid, and some ptosis, but both were much less than before.

There is a point of interest in this case which I may as well allude to at once, viz. the history of injury. Patients very frequently attribute attacks of gonorrhœal ophthalmia to injury, and, not seldom, where they are aware of the nature and cause of the disease; their reasons for so doing are similar to those of patients who assure us that a chancre was caught from a cart-wheel, or was the result of frost-bite, or that a gonorrhœa was caused by sleeping in damp sheets, &c. Nevertheless, some patients do not attribute the ophthalmia to gonorrhœal inoculation, and honestly believe that injury has been the cause.

Other conditions existing, injury may increase the chance of inoculation, from the fact that the patient is very likely to be constantly rubbing the eye. But beyond this I do not believe that injury has anything to do with the occurrence of gonorrhœal ophthalmia. It has, however, been suggested that the conjunctiva must be abraded before inoculation can take place.

This girl's history of injury was a true one, for she had been assaulted. Criminal proceedings were subsequently taken in the case; and a medical witness who attended the girl until she came to the hospital swore that the condition of the eye was entirely due to the injury; he was, however, unaware of any source of inoculation. Luckily for him the prisoner was undefended, and fortunately for the girl she did not remain under his care; had she done so she would, in all probability, have sustained more or less severe corneal damage in one or both eyes.

This may be fairly looked upon as a case saved from more

or less impairment of vision ; it seems very certain that the nature of the disease had not been recognised, nor as far as I could learn had any treatment beyond bathing with warm water been adopted.

In the following case carelessness on the part of the patient, and an error in diagnosis, or at any rate in treatment on the part of his medical man, were followed by the most disastrous results.

A man, *æt.* 40, came to me at the hospital some months since. The left eye was hopelessly lost, the cornea being entirely destroyed, and its position occupied by a dark grape-like bulge formed by the protruded iris. In the right eye the cornea had been perforated, but some small portion of it still retained its proper curvature, although it was opaque.

He gave the following history :—Nine weeks before I saw him the left eye became inflamed and painful, and the lids swelled greatly ; soon a thick yellow discharge made its appearance. The right eye then became affected in a similar manner ; he has been blind ever since. I could learn nothing as to source of inoculation.

The only treatment adopted for the first four days was bathing with warm water. He got worse, and at the end of the fourth day called in a medical man, who ordered some kind of drops (nitrate of silver ?) to be used three times a day, and a blister to be placed behind each ear. Very probably the damage was done before the medical man was consulted, but the treatment adopted can hardly be called energetic.

In all probability had this patient sought advice and been energetically treated when the first eye became affected, one might have been saved, and the excessive damage to the other have been mitigated.

As previously stated, the loss of vision in cases of purulent ophthalmia is due to corneal damage. Ulceration or sloughing may commence very early, its time of commencement and the extent to which the destruction of tissue goes being directly in proportion to the severity of the inflammation. But the condition of the patient's general health also appears to exert considerable influence upon the time of commencement, as also upon the extent of the damage done ;

the cornea of a strong healthy person will resist morbid changes much more effectually than that of a weak debilitated subject.

Ulceration usually commences at the upper margin of the cornea in the form of a crescentic patch, which may include a considerable area, or be confined to narrow limits.

The superficial corneal layers may alone be implicated, or the ulcerative process may extend deeply and rapidly cause perforation.

Suppuration or sloughing affects by preference the central portion of its cornea, but its whole area and thickness, with (as a rule) the exception of a narrow circumferential ring, may die and be thrown off, leaving the iris exposed.

In any case when the cornea becomes perforated the iris is pushed forward into the wound.

If a small perforation only have occurred, an opacity complicated by anterior synechia will result; but if a large gap be made, the iris bulges beyond the limits of the cornea and gives rise to a staphyloma. Staphylomata vary in size according to the extent of the opening; in some cases a little knuckle of iris alone is protruded, whilst in others the former position of the cornea is replaced by a dark bulge somewhat resembling in appearance (in a recent case) a black grape.

In other cases, again, the cornea becomes perforated, as it were, in a honeycomb fashion, a number of small staphylomata being formed, between which are the remains of corneal tissue.

The protruded iris soon becomes coated over with lymph, a dense white bulging cicatrix being eventually formed. Such is the condition in which we usually find most of the eyes that have been lost or severely damaged by purulent ophthalmia; but at times it happens that a considerable escape of the contents of the eyeball takes place at the time of perforation, in which case we may find the globe shrinking, or already wasted to a small irregular stump.

It may appear at first sight that in such an active and violent inflammation as purulent ophthalmia (especially the gonorrhœal form) depletory measures should be adopted. Experi-

ence, however, shows that an opposite course should be taken.

I have yet to meet with a case in which I would have recourse to general bloodletting, purgatives, antimonials, &c. Patients who are naturally strong and healthy, when they seek advice and treatment for severe purulent ophthalmia, are as a rule too much depressed to bear anything of the sort. I occasionally order a few leeches to the temples in very violent cases, especially if pain be a prominent symptom, but never do more in the way of depletion.

The objects we have to keep in view in the treatment of this disease are to check the inflammation, and at the same time to guard most jealously the vitality of the cornea; we should therefore avoid all remedies calculated to lower the patient's powers, and employ those which have an opposite tendency.

In mild cases of purulent ophthalmia the frequent use of alum or other astringent lotion will suffice for a cure. The lotion should be used as frequently as may be necessary to keep the eyes free from discharge—every two hours, hourly, or oftener according to circumstances; care must be taken to apply the lotion to the conjunctiva and not simply to the skin of the lids and face.

Some simple ointment should be applied at night to the edges of the eyelids and skin of the cheek, to prevent the former from sticking together during sleep, and the latter from becoming excoriated.

In the more severe cases a much more energetic plan of treatment must be followed.

The plan I adopt is as follows:—When the patient first applies, the conjunctiva, both palpebral and ocular, is cauterised thoroughly with solid nitrate of silver, then washed with salt and water; the eye is then lightly covered with a piece of wet lint, fixed to the forehead with a turn of bandage, and allowed to hang over the eye.

The patient (if treated as an out-patient) is directed to sit at home and constantly bathe the eye with alum lotion (gr. x to ʒj).

Some simple ointment is ordered to be applied to the lids

and cheek. If there is much pain three or four leeches are ordered to be applied to the temples.

Quinine or iron, or both, are prescribed, and the patient directed to live well and take a fair amount of stimulant; if sleep is impossible, opium is given at night.

Should the cornea be damaged the eye is kept bound up with a pad of lint soaked in belladonna lotion and a bandage, which are removed and the alum lotion applied as often as discharge collects.

The patient is seen in two days, and if not improved the nitrate of silver is again applied; if improvement have taken place the patient is ordered to go on with the alum lotion and medicine, and the nitrate of silver is omitted.

In all cases where one eye alone is affected the sound one is carefully shielded with pad and bandage, and the patient directed to sleep on the affected side, so as not to allow the discharge to run over to the sound eye.

The treatment is perseveringly carried out until manifest improvement has taken place, when the lotion may be used less frequently; but its use must not be entirely discontinued until all discharge has disappeared.

In cases where corneal damage has taken place the eye is kept firmly bandaged until cicatrisation is complete.

Undetected Glaucoma.

Perhaps the most common cause of preventable blindness, and certainly that to which the term most justly applies, is undetected glaucoma.

Two forms of glaucoma are commonly met with—the simple and the inflammatory, the latter being divided into acute and chronic.

Glaucoma, speaking generally, is an affection characterised by increase of intra-ocular tension accompanied by gradual or rapid failure of vision, and followed if no relief be given by atrophic changes in the structure of the globe. Of the causes of glaucoma we know but little; it may result from injury, or be secondary to inflammatory changes in some of the ocular structures, as keratitis, choroido-iritis, &c.; or may be set up by

the dragging and irritation caused by anterior or even posterior synechiæ; a swollen crystalline lens may also be a very fertile source of the glaucomatous change. Glaucoma arising from any of the above causes is known as "secondary."

But as a rule the disease comes on without apparent cause; it usually attacks persons past the middle period of life, but may occur in young adults or even in children; in the last, however, it is usually secondary. Of the treatment we know a good deal, but only empirically, as we are totally ignorant of the *modus operandi* of the measures taken for cure.

The simple form of glaucoma is that which we have principally to consider in the present paper, as it is the most frequently undetected; but it will be shown by notes of two cases that the chronic, and even the acute forms may be allowed to destroy sight, without the true nature of the disease being recognised, or the proper treatment adopted.

Simple glaucoma is in its onset as well as in its progress most insidious, and may go on for years before sight has become so much affected as to lead the patient to seek advice. Moreover, it attacks almost exclusively persons considerably beyond the middle period of life, who are only too ready to attribute their failure of vision to natural senile changes.

The symptoms are very gradual—failure of sight, with perhaps at times the appearance of coloured mists, and other obscurations of the visual field, tinted haloes around a flame, and abnormal increase of presbyopia.

On examination we find the pupil somewhat dilated and sluggish, the tension of the globe increased, the field of vision narrowed, more especially on its nasal side, the anterior chamber diminished in depth, the cornea somewhat flattened, and its sensation diminished, and the lens apparently hazy.

The ophthalmoscope shows some hyperæmia or cupping of the optic disc, and very possibly spontaneous or easily produced pulsation of the retinal arteries. Attacks of pain and inflammation do not occur.

Simple glaucoma may be, and frequently is, overlooked, the symptoms and naked-eye appearances being somewhat similar to those of senile cataract, for which it is not unfrequently mistaken.

A patient suffering from simple glaucoma, when at length

he has become satisfied that vision is failing in an abnormal degree, consults his usual medical attendant, who will very probably recognise the disease, but on the contrary may mistake the case for one of cataract.

The diagnosis of cataract having been made, the patient is advised to wait till it is ripe, when he can have it extracted. The patient goes on getting blinder and blinder, until the sight of one, or very possibly of both eyes, is reduced to perception of light, or even until perception of light is entirely lost. The cataract is now considered ripe, and either extraction is performed by the medical attendant (only to the bitter disappointment of both patient and operator), or the advice of an ophthalmic surgeon is sought, and what does he find? Very possibly opaque lenses, steamy, anæsthetic, and flattened corneæ, dilated, fixed pupils, shallow anterior chambers, large tortuous veins upon the surface of the sclerotic, rotten conjunctiva, and stony hard globes perfectly insensitive to light, the condition known as absolute glaucoma being developed; or more probably, on *using the ophthalmoscope*, the cataract is found to be a delusion, there being simply some slight nuclear opacity; but the optic discs are found deeply cupped, and, together with the retina, in a condition of atrophy. The tension of the globes is above par, and all vision hopelessly lost, and simply because the true nature of the disease was not early recognised and a timely iridectomy performed.

The following cases will show how simple glaucoma is mistaken for cataract, and how disastrous are the results of such an error.

CASE 1.—In October, 1874, I was asked to see a man in a small village who was said to have cataract. He was sixty-five years old, and had begun to lose the sight of the right eye six years before; he did not trouble himself about it until about three years later, when the left eye began to fail. He then consulted a medical man, and was assured that he had cataract and must wait.

On examination I found the tension of the globes increased ($T+1$), the pupils somewhat dilated and fixed, the lenses hazy, but not so much so as to prevent a full view of the parts behind; the optic discs were deeply cupped, bluish-

white in colour and atrophied, and the blood supply to the retina was much diminished. Neither eye had perception of light: no treatment was adopted.

CASE 2.—Emma D—, æt. 61, attended amongst the out-patients November 26th, 1875. The left eye had been failing eight or nine years, the failure of vision was accompanied by pain in the head, but none in the eye, nor were there at any time attacks of inflammation; she occasionally had coloured vision, and often saw a tinted halo around a flame. The right eye had begun to fail about four years before, the symptoms being similar to those which accompanied the loss of sight in the left. In both eyes tension was increased ($T + 1$), the pupils were moderately dilated, fixed, and somewhat irregular, the lenses apparently hazy. There was no perception of light in either eye.

The ophthalmoscope showed cupping and atrophy of the optic discs, with a few small retinal hæmorrhages in the left eye. There was no sign of cataract. She had been told that cataract was forming, and that she must wait. No treatment was adopted.

CASE 3.—Stephen J—, æt. 60. Admitted October 10th, 1875. The sight of the right eye had been gradually failing for two years; could distinguish shadows in a direction downwards and outwards; tension was slightly increased, pupil moderately dilated, fixed, lens apparently hazy. The ophthalmoscope showed the optic disc to be deeply cupped and atrophied, the blood supply to the retina being fairly good.

The left eye had only begun to fail eight months before, but vision had become rapidly diminished during the last month; there had been pain and some attacks of inflammation in the eye; tension was increased ($T + 1$), the pupil was fixed and dilated, and the media were hazy, but the disc could be dimly made out, and appeared to be cupped and atrophied; there was no perception of light in this eye. He had consulted a medical man when the first eye began to fail, and was told that cataract was forming and he must wait.

The disease in the left eye was evidently inflammatory glaucoma, but he did not appear to have sought any advice until the eye became quite blind.

Iridectomy was performed downwards and outwards in both eyes. A month later the tension of both globes was normal, and vision had somewhat improved in the right eye, the left, however, being still quite blind.

Cases similar to the foregoing might be multiplied to any extent, but the three reported will be sufficient for the purpose, viz., to show that simple glaucoma may be and often is mistaken for cataract.

The practical question we have to consider is, how is this error to be avoided? This can be done easily enough. We must always suspect glaucoma when a patient complains of the symptoms enumerated; we must never take naked-eye appearances as a test for cataract, otherwise we might find it in the majority of persons over fifty-five. We must in every suspected case make a *careful ophthalmoscopic examination*. A glance with the ophthalmoscope, however, will decide the question of cataract, by showing the characteristic bright red reflection in the pupil, unobscured by dark spots, streaks, or hazy opacity. Moreover, on more careful investigation, we shall probably find some of the other appearances mentioned as characteristic of glaucoma. Lastly, we must take care to ascertain the tension of the globes. Slight deviations from the normal standard are not easily recognised; however, by constant practice, and by carefully comparing the two globes together and with a known healthy eye, very slight increase of tension can be detected.

Besides the error of confounding simple glaucoma with cataract, we must be on our guard against overlooking glaucoma when occurring as a complication in cases of cataract.

The following case will show how such an error may occur, although no blame could attach to any one, as the glaucoma commenced in the interval between two of the patients' visits.

Mary S—, æt. 71, came amongst the out-patients February 26th, 1875.

The right eye was lost from an injury received some months previously; had no perception of light; tension was

slightly increased ($T + 1$); no pain. The ophthalmoscope showed opacity in the lens and general haziness of the media, so that no details of the optic disc, retina, &c., could be made out.

The left eye read Snellen 70 at twenty feet; the field of vision was normal; there were some opaque striæ in the lens; the eye was otherwise healthy.

March 5th.—The condition of both eyes was the same; she was ordered to come again in about three months.

August 9th.—Vision has grown rapidly worse. Right eye, tension considerably increased ($T + 2$); left eye, some increase of tension ($T + 1$); could distinguish large objects in the centre of the field of vision only. The ophthalmoscope showed cupping of the optic disc, the opacity of the lens was unaltered. Iridectomy was performed upwards in the left eye, downwards and outwards in the right.

26th.—The tension of both globes was normal (T_n), and vision of the left eye had somewhat improved.

September 14th.—Some increase of tension of left, iridectomy downwards.

October 1st.—Left eye can count fingers in centre of field; tension slightly above par.

13th.—Right eye quite blind. Left eye slight cupping of optic disc; retinal blood supply normal; opacity of lens has increased; counts fingers in centre of field, and has good perception of light in the peripheral parts; tension slightly above par.

I have little doubt that this patient's sight might have been preserved had iridectomy been performed when the glaucomatous condition first set in. She, however, had been told that her sight would gradually fail on account of the cataract, and that nothing could be done until vision became very much worse; consequently she did not become alarmed at the failure of sight, and waited patiently until she thought the cataract was fit for removal.

Unfortunately for her, when she at length presented herself, the retina had been subjected to pressure too long to recover its function.

Again, simple glaucoma may attack and entirely destroy the sight of one eye years before the other becomes affected.

and this not unfrequently without the knowledge of the patient, who does not discover that anything is wrong until the second eye begins to fail.

It is, however, remarkable that many persons, although aware that something is wrong, allow one eye to be entirely or nearly lost without seeking advice. In illustration of this I may relate a case that has come under my observation during the last twelve months. It is that of a gentleman who consulted me in November last (1874), simply because he had casually told his medical attendant (who insisted on his seeing some ophthalmic surgeon) that he was blind of one eye. He was in his fifty-ninth year, and had first noticed that his left eye was failing three years previously; it had at the time I saw him been quite blind for some months; he had never suffered any pain, and never bothered himself about his failing vision.

The tension of the globe was increased ($T + 1$); the optic disc was bluish white, deeply cupped, atrophied, and surrounded by a ring of atrophic choroid; there was no perception of light.

The right eye was myopic ($M \frac{1}{18}$ vision $= \frac{1}{2}$); there was no increase of tension of the globe, nor was the field of vision narrowed. The ophthalmoscope, with the exception of a small myopic crescent, revealed nothing abnormal. I showed him exactly what his state of vision was, and at what distance he could distinguish excentrically placed objects when standing with his face to a wall at the distance of a foot, and directed him to have advice so soon as he found that objects had to be brought nearer the centre before he could make them out. I did not attempt any treatment.

I have heard of him lately (June 24th, 1875), and as yet there is no change.

Again, some patients although aware that their sight is gradually going, in spite of treatment, show the strongest aversion to any operative interference. The following case may serve as an illustration.

Five years ago I saw a man at the Central London Ophthalmic Hospital whose only symptom was that he was gradually losing his sight; the tension of the globes was somewhat above par, and the optic discs were cupped.

Iridectomy was proposed, but he refused to submit to any operation; he remained under observation for about twelve months, during which time he took medicines, and applied leeches and a blister occasionally. He got steadily worse, and an operation was again proposed and insisted on; he refused to undergo it, and did not attend again.

I lost sight of the man until last year (1874), when I found him amongst the out-patients at St. Thomas's Hospital; his sight was much worse. I found that since he left the Central London he had been under the care of Mr. Wordsworth at Moorfields, and had also consulted Mr. Bader, and others; all had proposed iridectomy, and he had consequently discontinued his visits. What became of him eventually I do not know; it was his first visit at St. Thomas's, and possibly Mr. Liebreich was able to persuade him to sacrifice a portion of his irides to his remaining vision.

Inflammatory glaucoma presents much more marked symptoms than the simple variety. In the chronic form we find all the conditions which occur in simple glaucoma, but all are present in a more marked degree; vision becomes impaired more rapidly, and there are more or less frequent attacks of inflammation accompanied by pain.

The acute form is characterised by the violence and sudden onset of the inflammatory attacks, the severity of the pain, the rapid extinction of vision, and the great and quickly developed increase of tension; in some cases there may be severe and constant vomiting.

The following are fairly typical cases of chronic and acute glaucoma respectively, in both of which the disease was undetected until irremediable damage had been done to vision.

CASE 1. *Chronic glaucoma*.—September 29th, 1875, I first saw H. H—, æt. 56, an in-patient in a medical ward; she had then been in the hospital three weeks suffering from pleuro-pneumonia, from which she was convalescent. The left eye had been lost after an attack of inflammation some years before; the pupil was contracted, and adherent to some opaque material occupying the position of the crystalline lens; there was good perception of shadows, and the tension was normal. The vision of the right eye had failed in a marked degree

during the last six months, but for the last five years she had seen what she described as spangles; more recently vision had been obscured, at times, by beautifully coloured mists, and she had noticed a coloured halo around a flame; during the last three weeks she had suffered a great deal of pain in the eyeball and head, and vision had grown very rapidly worse.

She could make out the outline of large objects, as a person's head standing between her and the window; the anterior chamber was shallow, the pupil dilated and fixed, the globe hard ($T + 2$), cornea steamy, ciliary region much injected, iris discoloured, and some large veins were visible on the surface of the sclerotic in the equatorial region. The lens appeared to be cataractous, but the ophthalmoscope showed only slight haziness of the media; the optic disc was plainly visible, and was deeply cupped.

Iridectomy was performed in both eyes, and the opaque remains of the lens removed from the left.

She improved after the operation, so that on the 18th of October she could count fingers with the right eye and see her way about the ward; the tension of the globe, however, was still slightly above par. In the left eye some inflammatory changes had taken place, and the iridectomy pupil was filled with lymph; the tension of the globe was slightly increased. About a month later a second iridectomy was performed in each eye.

On December 18th she could make out Snellen 12 without assistance, and Snellen $6\frac{1}{2}$ with a convex 7 lens, with the right eye. The left had only perception of shadows, the tension of the right eye was still a little above par, but no further interference was deemed advisable. The ophthalmoscope in the right eye showed the media to be quite clear, although the deceptive appearance of cataract still existed.

CASE 2. *Acute glaucoma undetected.*—William L—, æt. 56, attended amongst my out-patients August 17th, 1875. His vision had been dim for two years, but he was able to follow his employment as a glass cutter till last November, when he was laid up with carbuncle. During the time he was in bed he had erysipelas and an attack of inflammation

and pain in the eyes. He was delirious for some days, and on regaining consciousness found that his left eye was quite blind, and that he could only distinguish shadows with the right; both eyes were somewhat inflamed. He told the medical man under whose care he was that his sight was gone, but no notice was taken of the condition of his eyes.

Four months later he was admitted into one of our surgical wards, with disease of the ankle-joint. He remained till some time in April, but curiously enough no notice whatever was taken of his eyes. Since he left the hospital he says he has been laid up at home, and could not go to seek advice about his eyes.

On examination both globes were found to be stony hard (T + 3); pupils dilated and fixed; corneæ steamy; lens apparently cataractous. The right eye could make out large objects in certain positions. The left eye had perception of bright light only.

The ophthalmoscope showed some haziness of the media, deep cupping and atrophy of both optic discs, and atrophy of the retina. Some atrophic changes in the choroid around the optic disk existed in the left eye only.

He was admitted, and Mr. Bader performed sclerotomy in both eyes. The tension of the globes was reduced, but no improvement of vision resulted.

In the first of these cases we have an instance of what is very common in glaucoma, viz. that the patient had premonitory symptoms, or rather that she suffered from simple glaucoma for years before there was any marked failure of vision; she had noticed for five years spangles and colours, &c. Such symptoms arising in a person about or beyond middle age should always arouse our suspicion, and lead us to watch carefully the tension of the globes and the extent of the visual field.

The condition of chronic inflammatory glaucoma, or chronic glaucoma, had probably only commenced at or shortly before the time that she noticed decided failure of vision, viz. six months before the date of the report. That the disease was undetected seems certain, from the fact that she was allowed to go on for three weeks under medical treatment without any notice being taken of the condition of her eyes;

possibly she was so ill in other respects that the ophthalmic trouble was not noticed, or if noticed only looked upon as of minor importance.

Iridectomy was followed by marked improvement, and had the operation been performed earlier no doubt a very much better result would have been obtained.

In the second case there were also some premonitory symptoms before glaucoma in its acute form made its appearance. Vision had been dim for two years. The onset of the attack was characteristic; it was sudden, and its effects were lasting. It is not always, however, that sight is lost entirely from the first attack of acute inflammatory glaucoma. In many cases the more violent symptoms pass off, and vision returns to a certain extent, but only to be extinguished by future attacks.

The disease in this case was no doubt to some extent masked by the other ailments from which the patient suffered, but still there appears (to say the least) to have been a great want of attention on the part of his medical attendant, "who took very little notice of the condition of this patient's sight."

It is in these cases of acute glaucoma that the good effects of iridectomy are most plainly manifested, especially if the operation be performed within a short time of the attack. I have very little doubt that this patient might now have been enjoying very perfect vision had a properly performed iridectomy been done when first the disease made its appearance. I doubt if any good result would have followed an operation at the time he was admitted into a surgical ward; but it seems somewhat strange that neither surgeon, house surgeon, or dresser, ever noticed what must have been as typical a case of glaucoma, in an advanced stage, as one could wish to see.

The treatment of glaucoma is entirely operative, and so soon as the nature of the disease is manifest, we must insist on operative interference. To give medicines, use lotions, blisters, leeches, &c., is simply to procrastinate and lose valuable time, and lessen our patient's chance of recovering useful vision.

The operations which have been most generally practised

for glaucoma are, iridectomy, paracentesis of the anterior chamber, divisions of the ciliary region, and sclerotomy. Our object in performing any of these is to reduce the tension of the globe, and unless a marked decrease in this respect follows the operation, it has failed to do that which was intended, and hence it must be repeated.

The operation of iridectomy is that which holds the foremost place as a means of reducing intra-ocular tension. Certain precautions must be taken in performing the operation, otherwise no good results will follow. We must bear in mind that simply cutting out a piece of iris is not all that is required. I have seen many cases in which iridectomy was said to have failed—where only the sphincter of the pupil had been removed, or perhaps a very narrow piece of iris, which; however, extended across its whole breadth, had been excised; the operation thus performed does little or no good. In performing iridectomy for the relief of intra-ocular tension we must be careful *to excise a broad piece of iris, extending from the pupil down to the ciliary attachment*. The position of the portion of iris removed is of no moment so far as reduction of tension is concerned, but disfigurement is avoided if the gap be made upwards, as it is then covered by the upper lid.

Nevertheless, I would advise the inexperienced operator to make his incision just external to the lower and outer margin of the cornea, and remove the corresponding portion of iris; the ease and safety with which the iridectomy can be made in this direction quite counterbalance any objections that may be made on the score of disfigurement. If the tension of the globe is not materially and permanently reduced by a single iridectomy, we must perform a second—preferably—in a direction opposite to the first; and if tension should then remain above par, the remainder of the iris should be removed.

Tapping the anterior chamber is, I think, simply playing with the patient, and those surgeons who recommend it allow that the operation must be done repeatedly to be of service. I have tried it, but have seen no permanent good result from it.

Of division of the ciliary region I have had no experience, but look upon both it and sclerotomy as directly opposed to all

our notions respecting accidental wounds of the eyeball, those in the ciliary region being always looked upon as fraught with the greatest danger to the injured eye, and as being more likely than wounds in any other situation to cause sympathetic ophthalmia. I have performed sclerotomy in a number of cases, but my experience of the operation is not such that I can recommend it. Its efficiency in reducing tension cannot be doubted, but I do not know that it is superior to iridectomy: in two cases which have been under my care, in one of which a single eye had been sclerotomised by Mr. Bader, in the other by myself, the second eye was lost from sympathetic ophthalmia. I excised the sclerotomised eyes, and performed iridectomy in the sympathetically affected ones, but the patients lost all useful vision.

It is in cases of acute glaucoma that the most marked results are obtained by operation; many patients who were to all intents and purposes blind have had almost perfect vision restored. In the chronic cases considerable improvement takes place if operative interference has not been too long delayed. In simple glaucoma the result of an operation is not very satisfactory; the disease is stayed, but no improvement takes place, and unfortunately in by far the greater number of cases we see, the morbid process has been allowed to go on till the power of vision has been very materially reduced, or total blindness has been developed. What we have to bear in mind in all cases of glaucoma is, *that the earlier an operation is performed for its relief the greater is the chance of a successful issue.*

CONTRIBUTIONS
TO
DENTAL PATHOLOGY.

By S. JAMES A. SALTER, M.B., F.R.S.

I. Hypertrophied Dilated Tooth-fangs.

ODONTOMES of the tooth-fang involving the hard tissues of the fang, more or less dilated and expanded, with or without calcification of the gigantic pulp, are among the rarest pathological conditions which the teeth exhibit.

In the 'Guy's Hospital Reports,' for 1868 I described the essential nature of these tumours. Two other examples had been published and figured before:—one by Mr. Tomes, the elder, who called it an exostosis; and the other by Forget, who stated that it consisted wholly of osseous tissue. The latter specimen was further examined by M. Broca, and though he came to the conclusion that the mass was an outgrowth from the dentinal pulp, he asserted that it consisted wholly of bone and contained no dentine.

In my paper in the 'Guy's Reports,' just referred to, I hazarded the opinion that both Tomes's and Forget's specimens were essentially the same as that which I had investigated and then described—that they consisted of a general fang-expansion, including all its elements—though the authors who had written about them had given a

different account of their structure; and, under that conviction, I remarked,—“I very much wish that both Forget’s specimen and the one described by Mr. Tomes could be very carefully examined histologically and in all their parts.” This wish has since been gratified, and with results which have confirmed my anticipations.

Mr. Charles Tomes examined the specimen which his father had described as an exostosis, and found it to consist of layers of crusta petrosa on the outside, then a shell of dentine, “the interior being filled up with an ill-defined osseous tissue” (calcified pulp).

In October, 1873, I communicated with Dr. Forget, through my friend, Sir John Cormack, who resides in Paris, and begged that he would have his specimen re-examined, with a view to ascertain if a layer of dentine did exist in the tumour. I sent Dr. Forget an outline tracing of his own figure, and I indicated with red ink the position (about the eighth of an inch within the outer limit, and thicker near the attachment of the tumour to the tooth) where I predicted dentine would be found. The investigation was undertaken by M. Robin, at Dr. Forget’s request, and I have subsequently been informed that dentine was found where I suggested it would be.

Since I last wrote upon this subject I have made some further investigations as to the minute anatomy of the specimen in the College of Surgeons; and recently I have had an opportunity of examining another example of this sort of tumour, remarkably simple and instructive, which occurred in the practice of my colleague, Mr. Bryant.

As regards the specimen I first described I was then rather hampered in the amount of examination which was permitted to me. The authorities of the College very kindly allowed me to make a section of the odontome; but I was not permitted to carry it beyond a certain depth, and it was strictly enjoined that the slice should not pass into the tooth itself. To these limits of section I therefore restricted myself, though very unwillingly. The results, as figured in my original paper (‘Guy’s Reports’ for 1868, page 467), sufficiently attest the fang-nature of the tumour, and that it in some way consists of an hypertrophy and prolongation of a fang, or some part of

a fang; but its exact anatomical relation to the elements of the tooth, to which it is attached, is not indicated. To supply this very necessary information I asked permission to make a deeper section, carrying it through the axis of the tooth and tumour. This was granted me, but I was desired not to extend the cut as far as the fangs of the tooth, lest the form of the specimen there and its general outline might be lost. The extent of this section was therefore limited by the line *e, e, e*, indicated in the accompanying figure (fig. 1). The different tissues and

FIG. 1.



Section of tooth and fang-tumour, in outline.

a. The oblique line from the crown above to the angle below indicates the surface from which some portion of the specimen has been broken away. The line immediately opposite the letter *a* represents the nearly closed pulp-cavity of a fang (?).

b, b. The nucleus of the tumour—calcified pulp.

c. True crusta petrosa.

d, d. The dentinal element of the tumour.

e, e, e. The limit to which this last section extended.

their arrangement are very distinctly shown, both in the microscopical section and in the polished preparation, now restored to the College Museum. The result of this further investigation is not, however, quite what I expected. The essential nature of the tumour itself remains obviously the same, but the connection of its nucleus (the calcified pulp) with the rest of the tooth is not as I expected to find it. This section discloses a circumstance, which was not before apparent, namely, that the tooth and tumour have, at some time, suffered mutilation. I had noticed, when examining the surface of the specimen, that the part at the back of the tumour where it joins the crown was somewhat rough and stained with slight and very superficial caries, but I did not suspect that any portion of it had been broken away: such, however, is the case. The section shows that there has been an important and most unfortunate lesion, taking away that part of the specimen which involved the connection of the nucleus of the tumour with the pulp cavity from which it emanated,—the very problem which I desired to solve by this fresh investigation. Nevertheless, the points that are shown are very interesting, and suggest a probable solution of the difficulty in question. The part where the fracture has occurred is about the region marked *a* in the figure, and it extends from the crown of the tooth obliquely backwards and downwards to the angle, involving an area of dentine, and the upper part of the nucleus of the tumour. How this fracture occurred it is impossible to tell—there is no history of the specimen; but that it happened during life is, I think, certain, from the carious stain of the broken surface. I believe that the dentine in the upper part of this fracture is the remains of an aberrant fang, passing backwards: the dentine looks like it in its structural disposition, and it is traversed by a minute pulp cavity stretching from the central chamber of the tooth to the letter *a*, just as one sometimes sees a very narrow canal in a tooth-fang. The pulp cavity in this tooth is curiously arranged, but it is accurately drawn,¹ and the linear prolongation towards the part broken suggests an erratic fang prolongation. But what exact relation had this fang to the

¹ This figure was drawn from the specimen by Mr. Morrit Williams, and his name is a sufficient guarantee for the fidelity of its delineation.

tumour? There can be no question, I think, that the broken-off part contained the vital point in question,—the union of the tumour to the tooth,—which now remains an unsolved problem, a matter of speculation and inference. Two explanations suggest themselves to my mind as possible:—one that the aberrant fang after passing back a certain way curved upon itself and terminated by expanding into the tumour; and the other that the tumour was a hernial offshoot from the fang. Of the two I incline to the former belief. But in either case, indeed with any conceivable explanation, the tumour must be considered to be hypertrophied, expanded fang.

The next specimen is one of particular interest, as it displays this form of tumour in its simplest and most elementary form. It is literally an hypertrophied, dilated tooth-fang, and nothing more nor less.

The specimen was obtained from a patient of my colleague Mr. Bryant, and the history of the case is worthy of attention. It is as follows:

J. G—, a boy, æt. 11, has had general good health, and the sanitary history of his family is good, with the exception that his eldest sister has evident symptoms of inherited syphilis. The crowns of the superior central incisor teeth of this boy have a distinctly syphilitic form.

When admitted into the hospital (May 31st, 1875), the patient stated that for something less than three years he had observed a swelling in the front of the upper jaw on the left side: it had caused him little inconvenience and no pain. Upon examining the mouth a tumour was seen situated at the alveolar border of the left intermaxillary bone, and looking very much in form and position like an epulis. It extended from the symphysis, which was slightly pushed aside, to the theoretic union of the intermaxillary bone with the maxilla, and it had so grown as to separate the central incisors the one tenth of an inch, and the left central from the left lateral four tenths. From its front projection to its extreme limit, where it ended on the palate, it measured nine tenths of an inch.

The growth was red, soft, and had a slight tendency to

bleed. It was neither painful nor tender; and the patient did not suffer from toothache.

On the 12th of June the patient was placed under chloroform, the mouth being opened by a gag, and Mr. Bryant removed the tumour with the implicated teeth. Two vertical cuts in the jaw were made with a saw, one between the central incisors and the other between the lateral and the region where the canine was just appearing high up—thus including the left incisive bone; and these were united at the base by a transverse incision with bone-nippers.

The subsequent history of the patient is without any pathological interest: he quickly recovered and left the hospital in a fortnight after the operation.

The removed mass consisted of thickened gum and much fibrous tissue, the lateral incisor in a normal condition, and the central incisor with a large bulbous fang. The soft part of the tumour may have been of the nature of epulis; but I had no opportunity of examining it when in a favourable condition.

The whole interest of the parts removed centred in the incisor tooth with the hypertrophied fang. The crown, as before observed, was syphilitic in form—contracted at its edge and with a crescentic notch: the fang, as shown in the accompanying illustration (fig. 2), was enlarged into a considerable bulb. The orifice at the end of the root was very large, and (what is not seen in either figure) a pointed hood or cowl projected from its rim on one side. A vertical section of this tooth, as shown in fig. 3, displayed the real nature of this tumour-like fang—this *odontome radicaire*.

There was nothing remarkable in the arrangement and proportion of the parts of the tooth in the crown and neck beyond its syphilitic character; but in the fang there was a large expansion of the pulp cavity, which was occupied by a soft uncalcified pulp. I have now submitted the hard structures of the fang to histological examination, and I find in their arrangement and proportion nothing exceptional: it is merely an hypertrophied, dilated fang, an *odontome radicaire* of the simplest conceivable kind involving the whole fang, and being axial to the tooth. As observations accumulate we shall probably have records of every degree and variety of these dilatations and hyper-

trophies of the roots of teeth, axial and oblique, simple and hernial.

FIG. 2.



Left superior central incisor, with hypertrophied dilated fang; seen sidewise.

FIG. 3.



The same specimen as Fig. 2 cut vertically in half and folded back; still held together by fibrous tissue.

Two interesting questions suggest themselves to me in reference to this case. Had the hypertrophy and dilatation of the tooth-fang any connection with the syphilitic character of the tooth? And had the abnormal tooth any connection, and, if so, what connection with the epulis-like growth?

As to the first point it must be recollected that whereas, in normally formed incisor teeth, they are broadest at the cutting edge, in syphilitic teeth they contract in that part. Is there any tendency to dilate in the opposite direction?

We have long been acquainted with the characteristic forms of the crowns of syphilitic teeth, but I am not aware that we have, as yet, any evidence as to whether roots undergo change of form. The present example suggests at least that such an inquiry is desirable.

As regards the epulis-like growth, it seems scarcely probable that its association with the malformed tooth was a mere accidental coincidence. Though there was nothing truly morbid in the fang hypertrophy, still the unnatural size may possibly alone have caused irritation, and so have occasioned the tumour of the soft structures.

II. Two Odontomes—"Warty Teeth," associated with Cysts.

Two odontomes of this rare and interesting character were brought to light in an operation performed at Guy's Hospital by Mr. Cooper Forster in the month of June last.

Before describing the specimens I will briefly narrate, in relation to them, the history of the patient from whom they were obtained.

E. C. D—, a girl, 18 years of age, in good general health, was admitted into Guy's Hospital on the 25th of May, 1875, under the care of Mr. Cooper Forster. She stated that she had noticed, about eighteen months before, a semisolid swelling about the size of a small marble over the premolar region of the right upper jaw. The swelling increased for nine months, till it became much larger, when the patient went to a surgeon, who incised the tumour, letting out a considerable quantity of sanguineo-purulent fluid. This led to a slight decrease in the size of the tumour, but the discharge of purulent matter from the wound continued ever after. The patient then consulted Mr. Hilton, who advised her to be admitted into Guy's Hospital.

On admission the right side of the face was seen much swollen; and upon examining the interior of the mouth a considerable intumescence was found, extending from the molar tooth nearly to the central incisor, and occupying the groove between the cheek and lip and the jaw. The hard palate on that side, and for the same space, was bulged and convex. There was a small opening on the outer gum in the premolar region, from which came a little discharge.

The condition of the teeth in the region of the swelling, as bearing upon its probable nature, was as follows:—The first and second permanent molars were present; the second bicuspid had not appeared, but the first was in its place; the central incisor was normal in position and form, but *the lateral and canine were both absent.*

On the 8th of June Mr. Forster operated on this patient. She was chloroformed, and then an incision an inch and a half

or two inches in length was made along the outer aspect of the tumour, from the first molar to the central incisor. This opened a cavity which was at first supposed to be the antrum. "The finger being introduced through this opening, and hooked round so as to sweep the external wall of the cavity, met with a hard and rough projecting mass, which had a distinct attachment to the wall at about the distance of an inch from the central incisor. A further search was made, when a depression in the gum at about the normal site of the lateral incisor was noticed, and a probe being introduced at this point tapped what was apparently a separate and distinct cyst, inasmuch as the fluid which flowed from it was uncoloured by the blood which had filled the main cavity. Mr. Forster then explored in this direction from the interior, and discovered a second mass of like character with the former, but having on it a substance which was believed to be enamel organ and some strongly adherent fibrous tissue. This mass was extracted by small forceps from its embedded position near the right side of the root of the central incisor." (Mr. Moon's¹ MS. notes.)

In the dresser's notes of this case it was assumed that the cavity which was opened by the incision was the antrum, and it was thus described. I doubt if it was so, however; and Mr. Forster now tells me that there was no real evidence that the antrum was entered: there was no discharge of pus, serum or blood through the nostril at any time, neither during the operation nor after. Cysts of very large size may exist in the pre-molar region of the upper jaw without communicating with the antrum, and I believe that such was the case in this instance.

From the positions in which these two hard masses were found, and from the absence of the normal teeth, they may be concluded to represent the canine and lateral incisors respectively. The first removed was the canine, and it had the additional evidence of one element of form; it had a pointed cusp; but beyond this there was nothing in its shape

¹ I am much indebted to my colleague, Mr. Moon, for these and for other notes, as well as an opportunity of seeing the plaster casts of the mouth of this and the previous case.

to suggest that it was a tooth, and this was wholly the case with the other mass.

These two bodies are represented in the accompanying illustrations (figs. 4 and 5) enlarged three diameters: figure

FIG. 4.



Mass representing canine tooth,
enlarged three diameters.

FIG. 5.



Mass representing lateral incisor
tooth, enlarged three diameters.

4 is the canine, and figure 5 the lateral incisor. From figure 4 projects downwards a pointed cusp, and the rest (as the whole of the lateral incisor) is amorphous, at least as regards tooth-shape.

The crown of the canine was very irregularly clothed with enamel, and it reminded me of a canine tooth with rocky enamel in an extreme condition, but beyond that the tooth displayed an irregularly lobulated, rough, porous surface of a pale brown colour. As regards the other tooth there was nothing in the form of a cusp, and the general surface of this mass was like the bulk of the canine tooth. Both were remarkably light, and their specific gravity, as tested in water, was very much less than a healthy tooth.

From general appearance with unassisted vision, and indeed with a pocket lens, these tooth-masses appeared to consist mainly of soft and porous *crusta petrosa*; they reminded me of very finely cancellated exostosis; and I certainly imagined that the exterior was composed of tooth-bone. A few white patches on the cusp of the canine I conjectured to be an ill-formed enamel, but even these were quite destitute of smoothness or polish.

Upon making sections for the microscope and submitting them to high powers, however, the bulk of the odontomes

proved to be an ill-developed enamel which covered in and filled up the gaps between complexed folds and processes of dentine.

There was extreme difficulty in making sections of these masses on account of their peculiar softness and brittleness, especially as regards the cortical portion ; and the dentine was so small in amount proportionately, and so much folded and divided, that it gave but little cohesion to the whole.

The ultimate histological elements of the sections I succeeded in making are, however, very interesting, and they closely resemble those figured by Heider and Wedl, in their 'Atlas of Tooth Pathology.' The structure of the *Dentine* is mostly abnormal, there are no regular pulp-cavities, but here and there interrupted canals from which the tubes emanate ; in other positions the cavities had been entirely obliterated. The tubes themselves are distorted in every conceivable manner, and they vary in size and form very considerably. In many places they are dilated into loculi of great size giving off brushes of smaller tubes. The surface of the dentine is in many places distinctly limited from the enamel, but in other parts they are confounded together ; the dentinal tubes and enamel fibres being mixed up. Interglobular spaces are very abundant. The *enamel* is most remarkable. It is of a yellow colour generally. In some parts it is nearly natural in structure ; but in others its usual histological characters are altogether wanting, and but for its continuity with the more normal enamel and its colour, the observer would not recognise the tissue. In these situations it is composed mostly of granules, and in some parts of large globules. The most singular circumstance in its structure is the existence of a number of tubes of considerable size running from the surface of the enamel towards the dentine. They are of precisely the same character as those shown by Heider and Wedl in their atlas, figures 32 and 39. These tubes display in their interior some remarkable globular outlines, the exact nature of which I am not now prepared to assert. In some situations bone lacunæ appear to be projecting into and among the enamel.

The *crusta petrosa* is scattered irregularly here and there, and I was nowhere able to make out a distinct layer. It

appears in some sections to be intermixed with the dentine. Many of the lacunæ are very large and of exceptional forms.

Such is the general character of these remarkable specimens. There are some points in their histology upon which I have not arrived at a definite conclusion. They require to be further investigated, and they should be accurately illustrated. Time and opportunity do not at present allow this; but I intend hereafter to pursue the matter further.

As regards these tooth-tumours generally, I would urge what I have written elsewhere,¹ that the term odontome is a legitimate and convenient expression; but it should certainly have a distinct and accepted signification. It appears to me that it ought to include *all* the hard-tooth-structure tumours, and be restricted to them. I cannot see why any one of them should be excluded; and unless the term be restricted to the hard tissues its limits and application will be vague and unsatisfactory. The classifying of tooth-tumours under a common head is comparatively of recent date; and the manner of their subdivision has not been distinctly affirmed and accepted. Unfortunately an author (M. Broca) whose contributions to this subject are otherwise valuable and interesting, has published an arrangement of odontomes so ingeniously inconvenient and illogical that it cannot be accepted as the permanent classification; and I am not surprised that it has received Professor Wedl's adverse criticism and condemnation.

Broca divides odontomes under four heads:—I. Odon-
tomes embryoplastiques; II. O. odontoplastiques; III. O.
coronaires; and IV. O. radiculaires. The first two terms
refer to the morphology and development of the tooth-
structures; the two last to the anatomical position of the tumours;
they are in no way parallel or equivalent expressions, and
they have nothing in common. The separation of "embryo-
plastique" from "odontoplastique" odontomes is an artificial
refinement which has no reality, and can only have been
conceived by ignoring the even and progressive evolution of
the tooth-structures. Who, understanding the morphological
and histological development of the teeth, can say that the

¹ 'Dental Pathology and Surgery,' p. 109.

tumours which Broca calls "Odontomes odontoplastiques" are not embryonic in their origin?

Again, Broca seems to have devised the embryonic section of odontomes for the reception of a heterogeneous assemblage of tumours, the dental nature of some of which is altogether doubtful.

The mere anatomical expression, as a "radical odontome," is also unfortunate, for that term might be applied with equal truth to an exostosis, an enamel growth on the fang, or to a dilated, hypertrophied fang—to the latter of which Broca restricts it.

Moreover, as Wedl points out, the tumours coming under an anatomical definition equally fall under the morphological term: thus the tumours in Broca's section 3 as truly belong to number 2.

It seems to me that Wedl has fairly explained the causes of Broca's infelicitous classification of odontomes, namely, "the absence of histological investigations in his account, and especially his disregard of the history of the development of the teeth."¹

In contrast with Broca's is Virchow's classification,² which appears to me simple and natural. He divides the odontomes into two classes:—I. Those which are produced during the development of the teeth; and II. those which occur after development.

Wedl,³ when commenting on Hohl's 'Monographie über Neubildungen der Zahnpulpe,' remarks that "a distinction must be made between odontomata occurring before and after the completion of the development of the tooth, namely, odontoma congenitum and acquisitum."

I was in ignorance of these passages in Virchow and in Wedl when, in my book on 'Dental Pathology and Surgery,' I suggested a similar subdivision of the odontomes. It appeared to me obvious, self-evident. The "congenital" and the "secondary or induced" (as I defined them) may be considered as the generic divisions of the odontomes, while the species may be defined and named according to their

¹ 'Pathologie der Zähne,' von Prof. Dr. C. Wedl. Leipzig, 1870, p. 116.

² 'Krankhaften Geschwülste,' von Rudolf Virchow. Berlin, 1863, Bd. ii.

³ Loc. cit., p. 228.

anatomical position and their structure. I believe that this classification will ultimately obtain; but whether it do so or not I am content to have adopted unconsciously the same fundamental views as Virchow and Wedl.

Malformed Tooth.

The accompanying illustrations represent a molar tooth malformed in an unusual and remarkable manner. The figures display the tooth in side view and at the fang-end.

FIG. 6.



FIG. 7.



The tooth, a second upper molar, was extracted by Mr. Rendle in the out-patients' room at the hospital. It consists of a normal crown: the enamel is perhaps rather short and the cusps more pronounced and with deeper fissures than usual. Then succeeds a long, nearly cylindrical body somewhat compressed on the outer side, and more so from before backwards. This terminates above by a short sudden expansion, forming a cup, from three points of whose edge (one on the inner side and two on the outer) project short mammilliform processes.

Upon examining the upper extremity of the tooth with a lens I found that one of these terminal processes is pierced by a single foramen, another by two, and the remaining one by three foramina.

Sections of the tooth showed the hard tissues to be normal in structure. The crusta petrosa is abundant, especially at the bottom of the cup. The axis of the tooth is occupied by a pulp chamber, filled with uncalcified pulp, of the same general form as the exterior of the tooth. Near its upper extremity, close to the cup, the cavity suddenly divides into

three very small canals which pass almost horizontally outwards, and two of these subdivide, but they all end at the extremities of the mammilliform processes. These latter are evidently representatives of the fangs.

This malformation of upper molars is very rare. A specimen of it was presented to the Odontological Society by Mr. Bellaby, of Nottingham, in 1871. This and another similar example are in the museum of that Society (numbers 256 and 257). Another instance is mentioned by Wedl.¹ Beyond these I do not call to mind any further example.

Mr. Bellaby's specimen has been described by Mr. Charles Tomes in the '*Transactions of the Odontological Society*':² it is in all essential respects the same as mine and Wedl's. Mr. Tomes found no processes homologous with the fangs, and the nutrient foramina were scattered along the edge of the cup. In my specimen the fang representatives are not to be mistaken. In Wedl's case there were three short prongs.

These malformed teeth are very interesting from their rarity, and from their being so entirely distinct and characteristic. I am not acquainted with anything intermediate, leading from any other malformation to this; and I agree with Mr. Charles Tomes in thinking that there must be some definite cause in their production, which is not as yet apparent.

¹ '*Pathologie der Zähne.*'

² Vol. iii, new series, p. 200.

A DESCRIPTION
OF THE APPEARANCES OF THE
HUMAN EYE IN HEALTH AND DISEASE
AS SEEN BY THE OPHTHALMOSCOPE.
NINTH SERIES—RETINITIS PIGMENTOSA.

By C. BADER.

THE disease known as retinitis pigmentosa, from its very striking symptoms as seen with the ophthalmoscope, early attracted attention, and has consequently often been described.

In an advanced stage the disease is readily recognised; its most striking symptoms refer to—

- (1) The general history of the patient.
- (2) The external appearances of the eyes.
- (3) The state of sight.
- (4) The ophthalmoscopic appearances.

(1) *The general history of the patient.*—The disease is found in persons whose parents or grandparents are blood relations before marriage; and in the first, second, or third generation of children whose parents have suffered from the disease. On the other hand, the disease is stated to be common among Hindoos, where no marriage is allowed among blood relations. Among sixty cases, carefully examined, consanguinity occurred in sixteen.

Deafness of different degrees is found in many cases; this

and the nystagmus may precede other symptoms for a long time. Syphilis, by some, is considered the usual cause. In none of the cases I have seen did I find the typical retinitis pigmentosa traceable to syphilis. Syphilitic changes of the tunics of the eye as a rule affect the choroid; the black pigment-spots have a roundish form, and but rarely the small linear or star-shaped figure seen in this disease: they do not increase in proportion as we approach the yellow spot; they are always accompanied by atrophic patches in the choroid; and one eye is as a rule much more affected than the other. These changes are the reverse of those occurring in retinitis pigmentosa. In addition, night blindness is often missing, or the functions of the retina at the yellow spot much depressed; the increase of impairment of sight is more rapid.

(2) *The external appearances of the eye.*—Nystagmus and posterior polar cataract are frequent symptoms. The former may appear long before or long after the other symptoms; the nystagmus sometimes is very peculiar; the oscillations of the eyeballs having an exactly vertical direction, without any rotatory or lateral deviation.

(3) *The state of sight.*—To be able to read the smallest type, and, even in broad daylight, to have lost the power of seeing objects, not directly looked at, has long before the use of the ophthalmoscope been known as belonging to a peculiar group of cases. In this disease, *in both eyes*, the lateral parts of the retina are destroyed much sooner than the central ones, hence the peculiarity of sight.

Some distinguish a typical and a non-typical course as to impairment of sight. In the typical course we find, *in both eyes*, good central vision, while the function of the lateral parts of the retina is disturbed; night blindness (hemeralopia); increasing concentric contraction of the field of vision; anomalies in the perception of colours. In the practice of others cases have occurred in which the ophthalmoscopic changes were typical, while either the contraction of the field of vision, or the central vision, or the night blindness, presented anomalies from the typical state. One case is reported where one eye presented the typical, the other the non-typical course.

The prognosis as regards sight is very uncertain; there is no hope of improvement when once the black pigment patches

have made their appearance. Cases in which pigmentation is slight or absent often remain stationary, or do not lead to blindness, or even do not reach a high degree of amblyopia. Blindness has been observed more often in young persons; high degrees of amblyopia more often above the age of forty-five.

(4) *The ophthalmoscopic appearances.*—In all cases, and in both eyes, we find changes in the optic disc and in the blood-vessels of the retina; while other changes, such as the black pigment-patches upon the choroid and in the retina, are altogether wanting in some cases, or are only slightly developed: this has led the ophthalmoscopist to distinguish a typical and a non-typical form of retinitis pigmentosa. The optic disc in the advanced stage assumes in both eyes a flat, waxy-white (anæmic and atrophic) appearance. The retinal blood-vessels in the disc and in the retina become thinner (anæmic), and less numerous; they may entirely disappear, white lines (empty vessels) may be seen diverging from the disc into the retina.

Of pigment changes we must distinguish (1) the pigment islands of the choroid, easily recognised by their shape, being situated between the choroidal vessels, and by their very pale colour in advanced cases; (2) the intensely black lines and patches resembling stars, or bone-corpuscles; they are densely scattered over the equatorial region of the retina.

Pathology.—The chief features of this disease are the disappearance of the optic nerve fibres and of the elements of the retina (except its connective tissue) in both eyes, with peculiar changes in colour and distribution of the pigment of the hexagonal cells. Where the black patches (groups of pigment granules) are seen, the hexagonal cells and the rods and bulbs have disappeared; these patches are situated, many in the retina, others upon the inner surface of the choroid; their absence or their arrangement in zones has given rise to the assumption of a typical and of a non-typical retinitis pigmentosa.

Numerous sections (made and examined by myself) from different retinæ show an entire absence of the rods and bulbs and of the outer granule layer; while the layer of optic nerve-fibres and of ganglion-cells can be recognised near the yellow spot. From the equator of the eyeball to the ora serrata the

greatly thickened, semi-transparent connective tissue of the retina, densely dotted over with pigment-spots, replaces the normal structure of this membrane. The walls of the retinal blood-vessels are much and unequally thickened, so that the lumen of the vessels is obstructed. There is also much light brown pigment in the vessel walls.

DESCRIPTION OF THE PLATE

Illustrating Mr. Bader's paper (Ninth Series) on Retinitis Pigmentosa.

Fig. 1.—A portion of the retina, choroid, and sclerotic from the equator of the eye, as seen with the ophthalmoscope while the patient looks upwards.

The red colour is caused by the blood circulating in the choroid; the black patches are situated upon the choroid; some beneath, others in the retina. No retinal blood-vessels are visible.

Fig. 2.—A good representation of the optic nerve (optic disc) of the typical retinitis pigmentosa. The retinal blood-vessels and a small portion of the adjoining retina, choroid, and sclerotic of the typical retinitis pigmentosa in an advanced stage of the disease.

The flat optic disc, occupying the centre of the figure, has the characteristic pale, waxy-white colour. The blood-vessels of the retina are extremely thin, few in number, and slightly varicose, pointing to impeded circulation and to an anæmic condition.

The pigment islands of the choroid and the anæmic condition of that coat as seen by the emptiness of its blood-vessels are well represented.

The well-defined, somewhat star-shaped, black pigment spots are situated in and beneath the retina. These, as further examination shows, increase in number the nearer we come to the ora serrata.

Fig. 3.—A portion of the retina, choroid, and sclerotica from the equator of the eye, as seen with the ophthalmoscope while the patient looks upwards. (From a non-typical case of retinitis pigmentosa.)

No blood-vessels are visible in the retina; the turbid red colour is the result of the slightly opaque retina masking the choroid; the pale red portion in the centre of the figure is due to the concentrated light of the ophthalmoscope.

The groups and lines of white, round, and well-defined spots are supposed to be atrophic spots in the choroid; they are not seen, as a rule, in the typical form of retinitis pigmentosa.

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ON THE USE AND ADMINISTRATION OF SEDATIVES.

By PAUL HENRY STOKOE, B.A., M.D.

I.

SYDENHAM is reported to have said that he would renounce his profession were he deprived of opium; and the modern physician, two centuries later, with so many and diverse curative appliances at his disposal, might well give up his calling in despair if sedatives, his principal *levamenta morborum*, were banished from therapeutics. In our function of alleviators of the physical maladies and infirmities of humanity it is our paramount advantage in the present day that we have not to depend upon opium alone, very numerous additions to our sedative *Materia Medica* having been made within the last few years. How important these additions are may be gathered from the statement made in 1821 by De Quincey—no mere dabbler in therapeutics—that “opium is the one sole *catholic* anodyne which hitherto has been revealed to man;” and in adding hemlock and henbane to the list he exhausts the catalogue of well-accredited sedatives of his time. If, however, we now possess in chloroform, chloral, potassic bromide, aconite, digitalis, atropia, and other sedatives, a much more imposing array of ease-bringing medicines, it is indubitable that the highly-strung nerves of modern society require greater power, certainty, and variety in the means of relief from pain, restlessness, and irritation, and the supply does not do more than keep abreast of the demand.

In scientific medicine there is a tendency—in theory at least—to look upon pain too exclusively as a valuable aid to diagnosis. It is only a symptom; and symptoms, we are taught, are not to be treated: but when we enter the sick room we find that we are not permitted to regard lightly that which to the sufferer is more often his chief concern. How eagerly sought for and gratefully enjoyed is that relief from pain and sleeplessness which it is mostly within our power to bestow, is aptly described by the author¹ from whom I have already quoted, when, alluding to the success of his first essay in opium-eating, he says, with inimitable banter, but with an undercurrent of profound significance, “Here was a panacea, a *φάρμακον νηπιεθες*, for all human woes; here was the secret of happiness, about which philosophers had disputed for so many ages, at once discovered: happiness might now be bought for a penny, and carried in the waistcoat-pocket; portable ecstasies might be had corked up in a pint-bottle; and peace of mind could be sent down by the mail;”—and that practitioner will be most valued and resorted to who, being well-endowed with knowledge and reputation, is most skilful in alleviating suffering.

It is advisable to explain at the outset that the generic term “sedatives” is here employed because it is both comprehensive (as it includes what are specifically called anodynes, soporifics, and hypnotics; and may even, without abuse of language, take in narcotics and anæsthetics), and also sufficiently definite, since in its proper signification it excludes such remedies for pain as arsenic, quinine, iron, and other tonics. Moreover, its employment has the advantage (no slight one when, as at present, the strife of the schools is at its loudest) of not committing us to any theory of the rationale of the action of these and allied substances, and thereby of not interfering with the especial object of these remarks, which is a practical one. Hence it may be concisely stated that the point of view from which we shall investigate our subject is indicated in the consideration, To whom and when may we administer sedatives, with the addendum, What sedatives should we employ under the varying conditions of illness, age, sex, and constitution? That these important and interesting

¹ De Quincey—‘Confessions of an English Opium-Eater.’

questions can be but cursorily examined is obvious, inasmuch as they come in contact with medical and surgical procedure at every turn ; nevertheless, some general directions may be laid down, and these can be made more impressive by reference to typical cases, the teachings of which may be expected to extend beyond the narrow boundaries of each individual case, and serve to render the exhibition of sedatives more certain and efficacious.

When we inquire to whom may sedatives judiciously and advantageously be given, we must needs reply that, practically, there is no limit to their administration ; 'for it is difficult to imagine that any one can pass through a life of average duration without requiring, at some stage of it, the solace of a sedative ; and if in any particular instance we dare not or care not to employ one kind of sedative, there is an abundance of others to which we can have recourse. There are, however, some limitations which we are bound to respect, the most familiar of which is age. To those who are intermediate in age between the old and the young it is but seldom that we are compelled to deny the luxury of a respite from pain or restlessness ; and the only question we usually have to consider in prescribing for them is, what is the most appropriate formula ; but if we purpose giving a sedative to the very old or very young we must be more cautious, especially in using any of the preparations of opium, as with them they are not only prepotent, but often cumulative in their effects. As a consequence of this for some years past I have trusted almost entirely to sedatives other than opiates in treating children in their first septennate, and I have seen no reason to believe that any want of success has ensued from this exclusiveness. That such a precautionary measure is not altogether uncalled for has been impressed upon me by my experience of the method of medication adopted by the more ignorant (including nurses and nursery-maids), whose frequent habit it is to increase the prescribed dose several-fold, or to repeat it with undue persistence, if it should fall short of the expected effect ; with what result may be conceived when two or three minims of laudanum have been ordered for an infant. With potassic bromide and conium for the various morbid conditions incidental to teething; chloroform for administration during the

paroxysm of a convulsive attack; chloral for those derangements in which insomnia is the prevailing symptom; aconite for inflammations, fevers, and feverishness generally; belladonna and hyoscyamus for many visceral disorders of a painful or obstinate nature; and combinations of these and other drugs to soothe coughs, and the innumerable aches and pains of neuralgic, myalgic, or rheumatic origin;—to say nothing of a host of external sedative applications, many of which are very potent; we need be under no apprehension lest we should be incapable of coping with the assaults of disease in children as effectually as we could do with one more weapon in our repertory. If we think fit to employ opium as an anodyne or hypnotic with those who have attained to or are on the high road to their second childhood, it is judicious to combine chloral and spirit of chloroform with it; the opium being prescribed in excess when pain, the chloral when restlessness, and the spirit of chloroform when cramp predominates; and the quantities of the several ingredients need not be large as each of them intensifies the effect of the others. The addition of from ten to twenty minims of the tincture of Indian hemp, a very invigorating soporific, to such a mixture as the above, is most serviceable in dealing with a heart enfeebled by advanced age or exhausting illness; and in thus prescribing it I have invariably met with an exemption from the distressing symptoms which sometimes result from the oppressive action of opiates on the respiratory system: it will be found that such a combination may always be given with safety in cases in which an opiate is at all admissible; and from its use sleep or ease from pain may be confidently predicted. As the insomnia of decrepitude is oftentimes exceedingly wearisome and quite unnecessary—not to say injurious, it is proper to allow wakeful old people to keep some mild soothing draught beside their pillows for occasional use; and it is a matter of common experience that the mere knowledge of the fact that there is a trustworthy sedative within reach will often induce sleep. This agreeable effect of the imagination is especially noticeable in delicate impressionable women, who may often by this simple expedient be prevented lying awake for hours, as they are liable to do from dread of a bad night's-rest: but in recommending sedatives in these and analogous cases the

medical man must not omit to utter a word of warning against their abuse ; a warning to which a melancholy emphasis is imparted by the recent accidental deaths of Mrs. Childers from the self-administration of chloroform, and of Lady Chesterfield from an overdose of opium.

The action of poisonous doses of opium appears to differ somewhat at the two extremes of life. The child suffering from the toxic effect of an opiate (as I have not infrequently witnessed in the cottages of the poor, from the careless use of those pernicious elixirs which are so freely employed to check cough or produce sleep,) is found, for the most part, pale and insensible, perspiring freely or not at all ; with weakened and retarded pulse ; slow and sighing respiration ; and presenting the typical contracted pupil ; unless the more advanced stage of narcosis is attained, when one or both pupils will probably be dilated, and convulsions may occur : but in the aged the condition is more often one of irregular and heaving breath, with a full and quickened pulse, swollen and livid countenance, and abundant perspiration ; and there is some degree of excitement tending towards delirium, which, in fatal cases, rapidly subsides into the well-known state of opium-coma. With the former it would appear that the cerebral system is primarily invaded ; with the latter the sympathetic and cerebro-spinal systems (especially the pneumogastric, spinal accessory, and intercostal nerves,) feel the brunt of the attack.

It is becoming quite a cuckoo-cry with our patients that opium does not agree with them ; and there are those who infallibly detect its presence however cunningly it may be disguised ; but that its disagreement is fanciful with the majority is shown by the fact that when we prescribe an opiate without their knowledge, or when their illness is sufficiently serious to divert their attention from too curious introspection, none of these imaginary evils ensue. In instances in which the intolerance was genuine I have given an acid preparation of opium, of equal strength with laudanum, known as nepenthe;¹ and as it proved in my hands free from the objectionable after-effects of sickness, headache, and constipation, I

¹ The manufacturers of nepenthe inform me that it differs from the ordinary preparations of opium principally in the absence from it of narcotine, and in its uniform strength.

have come to employ it almost exclusively in all cases, and have rarely found that it fails to afford refreshing sleep and ease from pain when prescribed in the ordinary combination with chloral and spirit of chloroform, although I am disposed to rate its hypnotic above its anodyne power. But while early life is most intolerant of opium, an entirely different condition obtains in the case of many other sedatives, especially the vegetable neurotics, conium, belladonna, and hyoscyamus. This is well seen in the approved treatment of chorea with conium, in which complaint I order one drachm of the succus of the London Pharmacopœia to be given in the morning to a child of from two to four years old, fasting; and increase the dose rapidly until as much as three drachms are taken at once. When I have had the opportunity of treating, thus energetically and from the beginning, an acute attack of chorea in a child, I have met with the best results; the arrest of the involuntary movements being speedy, sometimes almost instantaneous, and the cure being usually confirmed within a reasonable time by steel and arsenic, supplemented, if necessary, by smaller doses of conium at bedtime. But while the active motor centres of childhood bear powerful doses of conium with impunity, those of old age, which are weakened and inert, may be unduly affected if we attempt too urgently to bring them under its influence, as we might feel inclined to do in paralysis agitans and other diseases characterised by muscular tremor, or in the spasms of the voluntary muscles which sometimes attend upon acute softening of the brain. Under such circumstances we must exhibit our remedy tentatively at first, in doses not exceeding one drachm repeated two or three times a day; and we shall seldom find it desirable to go beyond double that quantity. There is a corresponding difference in the tolerance of belladonna and hyoscyamus by the old and young, the reason of which would appear to be that their alkaloids are very rapidly eliminated by the more active kidneys of early life, and hence produce a more fleeting impression on the system.

The following case may be introduced here, as it serves to prove that very considerable quantities of conium and chloral may be taken for a length of time, not only with temporary relief, but even with benefit.

Mr. E. S— consulted me in February, 1873, for red (?) softening of the brain. He was suffering from intense restlessness, with almost incessant movement of a purposeless character, persisted in night and day, and carried to the verge of exhaustion. Life was not merely a burden to him, it was absolutely insupportable. For seven years he had been hemiplegic on the left side, and during that period had had three apoplectic seizures. He was in the habit of taking powerful sedatives and inhaling chloroform. For the first two months after he came under my care he derived occasional relief from the hypodermic injection of morphia and atropia; but the result was so uncertain—even under the use of very large quantities—that I combined with it the internal administration of conium and chloral; and as a more reliable and satisfactory effect was thus obtained the injection was after a time dispensed with altogether, and the conium and chloral were steadily increased, until, in the November following, he was taking daily no less than two drachms of chloral hydrate and one ounce of succus conii, divided into three doses. Within the next four months it became necessary to increase the chloral still further, so that, ultimately, four drachms were taken every twenty-four hours besides the ounce of the succus; and this allowance was continued, without intermission, for upwards of a year in spite of repeated attempts to restrict it. A state of comparative quietude with improved mental condition followed, and Mr. S— was able, for the first time for more than two years, to transact business with his lawyer. The restlessness slowly disappeared, and sleep was often procured without recourse to the sedative, which was gradually reduced. This reduction was aided by the cautious substitution of Indian hemp for the conium; and ultimately the daily allowance was brought down to a maximum of forty grains of chloral hydrate and one drachm of the tincture of Indian hemp. During the whole of the time (about three years) Mr. S— was under my observation the disease made no perceptible advance, although his bodily strength progressively diminished, and he is at the present date (January, 1876) still living. From early manhood he had been subject to frequent attacks of idiopathic asthma, but soon after he began to take the chloral and conium this liability entirely ceased, and there

have been no unfavorable symptoms whatever other than the occasional appearance of an eruption—at one time urticarious, at another pruriginous—such as one sometimes sees in those who are taking ordinary doses of chloral.

Speaking generally, conium may be considered the regulator of disturbed voluntary muscular movement, and it is especially indicated in diseases accompanied by clonic spasm the result of direct or reflex irritation of the cerebro-spinal motor tract, and requires to be given in such strength as to develop its paralyzing effect upon these centres. But when the spasm is limited in duration, recurrent or periodical in outbreak, as in laryngismus stridulus and other convulsive disorders of childhood, in epilepsy at all ages, and in puerperal eclampsia, the sedative action (properly so called) of chloroform-inhalation will be brought into play with more advantage, as it is more rapid, direct, and transitory, and its administration is practicable during insensibility or amid struggles for breath.

In using chloroform in spasmodic affections which are accompanied by little or no pain very small quantities, such, indeed, as are insufficient to cause narcosis even, should be inhaled, as by this means we obtain the full effect of the anæsthetic *quoad* the requirements of the disease; while at the same time we are able to protract its administration, if it should be requisite, over many hours; but when we are dealing with diseases in which painful tonic spasm is the predominating symptom—more especially when the spasm arises from the passage of biliary or renal calculi through their respective ducts—the full anæsthetic effect must be produced, as we have both to deaden the severe pain which is mostly present, and to thoroughly relax the muscular fibres of the implicated parts: but even in these unpromising cases I have sometimes known the fullest relief afforded, and the passage of a stone facilitated by very moderate inhalations.

I must acknowledge that chloroform has not answered my expectations in obstetric practice, for I have too often found that it retards delivery by subduing the pains and prolonging the intervals. After a somewhat extensive use of it I have arrived at the conclusion that in ordinary labours, if we decide upon using it at all, it is best to administer it just

before the accession of each pain, in such limited quantities as barely suffice to keep the patient in a semi-conscious state. In this condition she may moan and complain during the pains, but it will usually be found, when delivery is completed, that she has had very little knowledge of them. It may be given, however, without hesitation towards the termination of labour, when the pains are violent and the perinæum tense and unyielding: the end being then in view, and the woman cheered by the prospect, and having, it is presumed, an adequate reserve of strength, any delay that may ensue from its use is more than compensated for by the relief from what is often the terrible agony of the final expulsive efforts; and under such circumstances we may venture to exceed the prescribed allowance, and bring on more complete anæsthesia.

To primiparæ, whose labour is unusually severe and protracted, either from a large fœtus, straitened space, or, what is more common, a dry and inelastic condition of the soft tissues, it is my habit to afford modified anæsthesia, with the best results so far as comfort, cheerfulness, and capability of endurance are concerned, and without any detriment to the general progress of parturition. My plan in these instances is so to administer the chloroform as to procure to the expectant mother one or more intervals, of about an hour's duration, of tolerably complete respite from pain. In the more moderate inhalations (from ten to fifteen minims) chloroform will often prove of singular service when the dilatation of the os is opposed by its persistent dryness or irritability—this latter condition being not infrequently accompanied by thinness of the margin; but the direct application of belladonna is likely to overcome this obstacle more effectually if time allows of its more tardy action. If, however, the pains should be frequent and violent, and the os undilatable, chloroform is more suitable, as it serves to lessen the injurious irritation arising from the rough impact of the child against the hyperæsthetic structures, and thereby furthers the natural evolution of the uterus. Again, there is a class of cases in which the effects of chloroform-inhalation appear little less than marvellous, viz. when, after a lengthened and wearisome succession of pains under which the os has dilated, the soft structures have become thoroughly relaxed, the head has descended through the

brim, and is beginning to press upon a perinæum disposed to yield, suddenly and inexplicably both pains and patient seem worn out, and there ensues an almost total cessation of expulsive efforts: under these by no means rare circumstances one or two applications of the inhaler, charged with a scruple or so of chloroform, will revive the flagging powers, light up the pains afresh, and bring the labour to a speedy conclusion.

In its action in parturition chloral appears to be almost identical with chloroform; but inasmuch as at these times we are called upon to meet contingencies as they arise, and not to provide for what it is not always possible to calculate upon beforehand, I cannot but consider that chloroform—although worse than useless in simple, easy confinements—best fulfils all requirements as a stimulant, a sedative, or an anæsthetic. Both in childbed and in its employment for operative purposes, when time permits, I give a preliminary full dose of opium, about an hour before commencing its administration. In so doing I find that less chloroform is required to produce the desired effect, that this effect is prolonged, and, what is of still more importance, the vigour of the heart is better maintained: and since solid opium is more deliberate in its operation, I usually give it in this form. It need scarcely be said that when operative measures, whether by hand or instruments, are required for delivery, full anæsthesia must be induced.

The following case from my note-book is instructive, and serves to illustrate some of the ill effects of chloroform in midwifery, and at the same time indicates the remarkable property of opium as a singularly valuable cardiac restorative in extreme exhaustion.

Early one morning, in March last, I was summoned to attend in her first confinement Mrs. J—, a lady twenty-five years of age, in good health but of very excitable temperament. When I arrived the pains were beginning to be felt but the os was not dilating; the presentation was natural, and the pelvis spacious. I visited her several times during the day, and prescribed ten-grain doses of chloral hydrate every two hours, which brought ease and sleep. Fourteen hours after I first saw her the pains were gathering strength and frequency, and

she began to exhibit a lamentable want of fortitude in bearing them. As they increased in severity she rushed about the room, tore her clothes, and screamed and gesticulated like a maniac. With some difficulty I persuaded her to lie down, and after she had had an opiate I commenced the careful inhalation of chloroform, which soothed her greatly and kept her within bounds. I persevered in this with brief intervals for twenty-seven hours; for so often as it was discontinued and she felt the pains at all acutely, she broke out so frantically as to appear to be in danger of exhausting herself. Meanwhile labour progressed but slowly, and troublesome sickness set in; and as there had been but little power and less inclination to take food, a state of prostration gradually supervened, which, at the end of about forty hours from the commencement of labour, placed her in a condition of serious exhaustion, with very rapid pulse, and feeble and inefficient pains; while the head of the child was still above the brim and the os only three parts dilated. Soon the vomited matters assumed a coffee-ground appearance, the vaginal passage was found to be dry and hot, with occasional scanty sanious discharge, and low muttering delirium succeeded what had been almost maniacal raving. I now lost no time in delivering her with the long forceps, after having brought her under the full influence of chloroform as she opposed the application of the instruments so long as she retained any sensibility; and the child being extracted and the placenta removed, her restoration to consciousness was accelerated by the aid of amyl nitrite. She was now in a most alarming state; her face was very pale and bathed in perspiration; her voice—when she attempted to speak—was inaudible, and she could not see objects around her; the pulse was rapid beyond calculation, the heart's impulse imperceptible, the respiration jerky and sighing, and the whole surface as well as the extremities stone-cold, while slight convulsive tremors flitted over her face and frame: at the same time dark fluid oozed slowly out of the angles of her mouth, and, to add to the perils that environed her, some passive hæmorrhage showed itself. Ammonia, brandy, and champagne were forced down her throat successively, but only to be immediately rejected; warmth and friction were freely applied; the uterus was steadily grasped and the nipples were

irritated, and by the constant application of amyl to the nostrils she seemed to be just kept alive, although to all appearance life was ebbing away. I then gave her one drachm of laudanum undiluted, which was kept down with some slight signs of improved circulation for perhaps a quarter of an hour, when, the vomiting recommencing, I gave another similar dose, which was retained; and within a few minutes the respiration became more regular, the circulation was gradually re-established, and warmth returned to the extremities. In an hour's time, without further treatment, she was in a comfortable sleep, with a steady and tolerably full pulse, and calm breathing; and recovery followed in due course without a single drawback. The especial teachings of this case are the doubtful advantage of chloroform in the early stages of labour, and the danger of its employment as a full anæsthetic immediately after it has been administered for a long time in a milder form; the rapidly invigorating effect in extreme exhaustion of a large dose of opium in a concentrated state; as well as the powerful, but necessarily temporary, restorative action of the inhalation of amyl. Had the hypodermic apparatus been at hand, I doubt not I should have tried it instead of giving the opiate by the mouth; but I believe its effects would have fallen far short of the latter.

I will here avail myself of the opportunity of recording a case which appears to demonstrate the utility of chloral and potassic bromide in deferring (at least) that fearful malady, puerperal mania. A lady, whom I attended in all her confinements, suffered from a severe form of mania in five of them. She escaped altogether in the first; but in the five consecutive confinements, all of which were natural and easy, mania—sometimes of a suicidal or murderous type—occurred within a week of delivery. The principal, if not only premonitory symptom was sleeplessness, there being no other apparent interruption to her usual condition of robust health. The onset of all of the attacks was sudden and severe, but after longer or shorter intervals she entirely recovered from them. For a fortnight before her seventh confinement I kept her under the soothing influence of small and repeated doses of chloral and potassic bromide; and this treatment was persevered in for six weeks subsequently, when, imagining that the

danger was past—for she was taking her food well, sleeping soundly, suckling her baby, and exhibiting much vigour of mind and body,—it was discontinued; and three days afterwards, without any warning, she broke out into acute mania, which in its violence and duration exceeded any previous attack. Having no further experience of the effects of these sedatives in puerperal mania, this case must stand alone; and needs, I think, no comment.

If we intend to anæstheticise children there is nothing so serviceable as chloroform. M. Bouchet has recently stated, at the Congress of Brussels, that he procures insensibility in children sufficiently complete to open abscesses and extract teeth painlessly by doses, of from forty-five to sixty grains of chloral: at the same time he claims no anæsthetic effect for large doses of chloral given to adults. It is not however at all evident that the indirect possesses any advantage over the direct method of introducing chloroform into the system; and if we have regard to the uncertainty of the effect, the bulk and nauseousness of the dose, the fact that insensibility is not established in less than an hour, and the risk of its employment in such large quantities, we may be content to wait for further evidence in its favour before we discard what is so reliable and comparatively innocuous with the young as chloroform.

In administering this agent to children, if (as is often the case) the little patient should be frightened at the sight of the inhaler, it is a good plan to let him handle the instrument, and see for himself that there is no harm in it; and if that should not reassure him, we may usually succeed in bringing a lightly charged handkerchief into proximity with his face; or may even present a small quantity of the anæsthetic to him in the hollow of the hand, without creating alarm, and thereby overcome his first scruples, when the completion of the operation will present no difficulties. In the administration of ether or chloroform both to old and young, if the accurate apparatus of Mr. Clover be not used, the more deliberate application of the anæsthetic on a folded cloth, which is so adjusted as not to exclude air from the mouth and nostrils of the patient, *who must be reclining in a horizontal position*, will

insure immunity from danger, although it will probably tax the patience of the operator.

While we cannot fail to recognise the services of sedatives in many very different forms and phases of disease, we shall find them exerting their most valuable and specific influence over pyrexia, both sympathetic and idiopathic. Of this pneumonia affords a pregnant instance; and I am acquainted with no treatment of this formidable disease at all comparable with that which combines the use of small and repeated doses of aconite, opium, and belladonna, with judicious stimulation and rest. Counter-irritation, except in the prodromal stage, is of questionable advantage; as it produces a local acceleration of the circulation which sooner or later becomes general, and thereby contravenes the principle of rest, the maintenance of which is so essential to well-being in this disease. But in the presence of severe pleuritic pain, hot or cold fomentations (I greatly prefer the former) with or without turpentine, or what is often better, with opium dissolved in equal parts of chloroform and alcohol, may be cautiously applied, and persevered in if there is no sign that the circulation is thereby disturbed. Sometimes, when warm and moist applications (among which the hot or vapour bath may be included) are freely used at the onset of the attack, they will (by diverting the stream of circulation from the loaded capillaries of the lung into those of the skin, and by reducing at the same time through perspiration the fluid in the body) supply that element of rest which the exigencies of the disease require; and if with this treatment we combine repeated small doses of the tincture of aconite, which by diminishing arterial pressure and acting freely on the skin still further lessens the congestion, we may succeed in procuring early resolution. An equally happy termination of a threatened attack of pneumonia is said occasionally to follow the timely use of a Turkish bath; and the explanation of this is not far to seek, if we bear in mind that the powerful action of this remedy on the skin and circulation very closely resembles that of aconite and warm moist applications.

Before we attempt to estimate the value of the medication of pneumonia by neurotic sedatives, it will be well briefly to review the pathology of the disease so far as it is known, in

order to compare the indications for treatment with the results obtained by the use of these agents. Whatever the entity inflammation may be (for now that Dr. Burdon-Sanderson has once again sent us adrift on a sea of uncertainty, it is not permitted us to imagine that we at all understand the essence of the process,) there can be no doubt as to the general condition of a person who has one or both lungs attacked by it. In addition to the serious constitutional derangement which is associated with an inflammation of a vital organ we have, as the first weakened link in the chain upon which life is dependent, a heart rendered incompetent, not only throughout its entire substance from imperfect nutrition, but more especially on its right side from excess of retarded blood within it. This retardation arises, in the early stages of the disease, from the congestion of the capillaries of the lung, but in the later from the pressure of effused fluid of a serous, sanguineous or purulent character upon the air-cells; but whether it is congestion or exudation that causes the obstruction in the pulmonary circulation, and the consequent overfilling and distension of the right heart, the result is the same, with some difference in degree; this difference in degree being less marked in favorable cases, because in them the heart succeeds in accommodating itself to the restricted circulation by the time that splenization or hepatization has taken place.

The uniform symptoms of the disease (*e. g.* rapid pulse, accelerated and shallow breathing, and dyspnœa,) indicate that the organs of circulation and respiration have been, so to say, thrown out of gear, and are chiefly owing to the unavailing efforts made by the heart to carry on the circulation effectively: hence we find in fatal cases that death is most frequently due to cardiac exhaustion. But we have other important factors in the sum total of pneumonia. There is the pyrexia, which being the outcome of inflammation in a highly vascular structure—a structure which cannot be exonerated from the performance of active duties—is more than ordinarily severe, and intensifies the derangement which arises from the altered mechanism of the pulmonary circulation. It also causes a serious diminution of the strength and substance of the body; and this loss is accompanied by increased oxidation. Moreover, at the seat of inflammation

there are the products of exudation, which are prone to undergo degenerative changes. Consequently it may be said that the special indications of the disease are to arrest, if possible, the inflammatory process in its incipient stage; failing this, it should be our object to reduce the circulation through the partially disabled lungs to the lowest pitch compatible with efficient oxidation; to strengthen and at the same time calm the heart; to lessen tissue-waste and support the vital powers generally; to counteract the tendency towards purulent degeneration, and gain time for the establishment of the restorative processes of reabsorption and regeneration.

How pneumonia may be cut short in its prodromal stage has been shown; but more often the precursory signs are obscure, or do not come under our observation until the disease has passed beyond the reach of benefit from the modified treatment by aconite and counter-irritation, when we shall be obliged to have recourse to more specific measures. In practice it will be found that the key to successful treatment is to preserve the correspondence between the force and activity of the heart and the receptivity of the lungs; and when both lungs are extensively affected this is a very delicate problem indeed, as we have cardiac exhaustion beckoning on one side, and suffocation threatening on the other; for, by overstimulating the heart, we increase the congestion and add to the area of diseased lung, thereby running the risk of inducing asphyxia; whereas, if we fail to support this organ, death from asthenia will probably ensue.

The old rough-and-ready method of modulating the circulation and respiration and unloading the right heart by letting blood would be unimpeachable were we repairing a mechanical hydraulic machine, in which limited stagnation had occurred through the pressure of a superabundant and too rapid circulating fluid upon a network of vessels; but inasmuch as we are dealing with a complicated vital apparatus, and with a fluid through whose instrumentality this apparatus is kept in motion, and inasmuch as we are ignorant of the amount of work which this delicate organization may be called upon to perform in the course of the complaint, we shall abstain, if we are well advised, from diminishing by one single drop that fluid which is the mainspring of existence. And not only is

bleeding unjustifiable on pathological grounds, but it is overwhelmingly so in the light of modern therapeutic research, which has demonstrated that we possess means competent to produce all the mechanical benefits (if any there be) which flow from abstraction of blood, without entailing any of those dangerous physiological consequences which attend upon an exhausting drain on the system.

Now the well-established action of aconite is to diminish the abnormal activity of the circulation by retarding and subduing the heart's action; to remove arterial tension, and lessen the rapidity of the respiration; to act upon the skin, and lower the temperature; in fine, to counteract pyrexia; and these salutary effects are no doubt in a great measure due to its control over that excessive degradation of tissue which is the essence of pyrexia. Opium, in small doses such as we administer in pneumonia, augments the force of the heart, and in so doing rectifies what might otherwise prove the too depressing action of aconite; at the same time it exercises a soothing influence over that organ and the system generally, abundantly promotes perspiration, and discharges some obscure but most important offices of nutrition whereby waste is restricted and strength maintained. Belladonna communicates tone to the heart, and in its stimulating action on the kidneys and liver corrects the contrary tendencies of opium: it also acts most serviceably in precluding the dangerous paralyzing effect occasionally exerted by opium on the respiratory muscular system. Hence it will be seen that in employing aconite opium and belladonna we obtain, if they deceive us not, increased tone, force, and calmness in the heart's action; an approach to equalization of the circulation through the removal of arterial tension; a reduction in the frequency of the respiration; a diminution of the excessive wear and tear of tissue, with a lowering of the temperature; and besides this negative support to the strength, we have a positive addition thereto in the remarkable sustaining properties of these substances; and, what is worthy of especial notice, we obtain a lower rate of oxygenation, partly through the indirect influence of these remedies over pyrexia, partly by their direct action (as proved by experiment in health and disease) in restraining that process; and over and beyond all these notable and

salutary effects (which respond in every particular to the indications of the disease) we have active elimination of effete matter and consequent purification of the blood, resulting from the stimulus imparted to the various excretory organs of the body.

The sustaining power of these neurotics, to which we have already alluded, is deserving of more than a passing notice, for through it we are enabled, especially in the earlier stages of pneumonia, to dispense to a considerable extent with other kinds of support, and thus carry out one of the indications for treatment. And this is of very considerable importance, because such nourishment as we should ordinarily order for a patient suffering from pyrexia is unsuitable in this disease, as it augments that oxidation which cannot be sufficiently deprecated. Hence the almost exclusive employment of alcoholic stimulants as food is appropriate in the damaged state of the lung, as they maintain strength, diminish waste, and lower oxygenation in the body, and enable it to pass with safety through a temporary crisis. It also appears, from the experiments of Dr. Lionel Beale, that alcohol is potent in arresting the formation of pus-cells; by which agency it will, when the stage of hepatization is reached, fulfil an important indication furnished by our pathology. As a deduction from this we recommend small and repeated quantities of alcohol from the commencement of the attack, and almost total deprivation of other nourishment except milk alone.

But occasions sometimes arise in the course of the complaint in which what are called expectorant stimulants are required, either to supplement, or for a time entirely supersede alcohol. A cyanotic condition, which is of grave import, and betokens very imperfect aeration of the blood, is a capital instance in which we should anticipate benefit from expectorant stimulants, of which ammonia is the chief; and in its effects we have in all probability a specific action upon the muscular fibres of the ultimate bronchi, by which the expulsion of the perilous stuff which chokes them is facilitated.

To make this sketch of the treatment of pneumonia complete, I must add a few words on the utility of rest, which, if it is to produce adequate results, must be carried out with thoroughness. This principle of rest in reality underlies all those measures which

have for their object the avoidance of unnecessary oxygenation—such as a limited diet, the arrest of degenerative processes, and so on, which have already sufficiently engaged our attention ; and to them may be added muscular movement of every kind, which uses up the oxygen in the blood and replaces it by carbonic anhydride ; a low temperature, which necessitates more active combustion in order to keep up the warmth of the body ; too high a temperature also, which militates against rest by exciting both heart and lungs to increased exertions ; while, in a minor degree, the beneficial effects of absolute silence and of quietude of mind and body are too obvious to be insisted on.

We will now invite attention to the effect of sedatives in inflammation of the peritoneum, as a further illustration of their use ; and although in this disease their action may be less extensive than in inflammation of the lungs, it can be shown to be equally definite and specific.

In peritonitis we have the customary accompaniments of inflammation, *e. g.* undue waste of tissue, high temperature, accelerated circulation and respiration ; with more than the ordinary disturbance of the sympathetic, expressed by the extreme arterial tension (wiry pulse), and proneness to death from asthenia. It is unnecessary to recapitulate all the services we may expect to be rendered by our neurotics under such conditions ; suffice it to say, that the pyrexia is fairly met by aconite, although its specific action is not so marked as in pneumonia, and its depressing effects on the heart require watchful care ; and that belladonna best fulfils its especial rôle when it is freely applied, in the form of the extract diluted, over the whole abdominal surface. But it is to opium we give the ascendancy in the treatment of peritonitis, as it responds with singular completeness to the indications of the disease. Thus it imposes rest, both mechanical and physiological, on the whole intestinal tract ; it eases pain to an extent that nothing else can approach ; it lessens arterial tension ; it sustains the strength generally, and especially invigorates the heart. These various salutary effects are best produced by small doses (from half a grain to a grain) of solid opium, repeated more or less frequently according to the amount of pain or depression present. Sometimes I have given half a

grain every half hour during the greater part of twenty-four hours; and it will be found that the tolerance of this drug is very remarkable in this complaint. But if we push it to the extent of narcotism we lose its sustaining power, as depressing reaction inevitably follows. In the more acute attacks it is necessary to persist in the employment of opium long after the pain and feverishness have become mitigated; and it is advisable to leave the bowels to resume their functions naturally, even if two or three weeks elapse without any action. I have more than once known serious mischief occasioned by too great eagerness to procure evacuation: never any harm from delay.

But besides the more obvious uses of opium in this disease we have its very important effects on the maintenance of strength. In examining notes of some severe cases of peritonitis, what strikes me particularly is the trifling amount of sustenance of any kind taken by those who were undergoing what we know to be a very exhausting illness. I find that opium was sometimes taken every hour, and persisted in perhaps for a week or more, and a little stimulant besides; the latter being given by the mouth in a dilute form and in small quantities, so as to be absorbed before it had passed into the bowels; and if sickness were an urgent symptom, an occasional minute dose of calomel was administered, but never with the idea of producing its specific effect. And this, with the addition of a modicum of thin arrowroot or a little milk has constituted the entire regimen; with the exception of such general hygienic measures as a comfortable temperature, fresh air, iced water to drink, quietude, and the like. After the bowels had been locked up, sometimes as long as a month, there would be a prodigious accumulation to be dislodged, which might perhaps occasion some distress, but if there was no meddlesomeness it would pass safely enough.

STATISTICS OF AMPUTATIONS.

By C. H. GOLDING-BIRD, B.A.

In vol. xlii of the 'Transactions' of the Medico-Chirurgical Society, a paper has been published by Mr. Bryant, showing the rate of mortality after amputation, and arranged according to the part operated upon, and the cause which in each case led to the operation.

It records the result of fifteen years' experience at Guy's Hospital (1845-59), the operators being the various members of the surgical staff, and it ranges over a series of 300 cases (Table I).

The tables drawn up in this paper are in part a sequel to Mr. Bryant's, extending over the subsequent fifteen years (1860-74); one of them, a combination of these two periods, includes the total results of all amputations, amounting to 859, and represents a hospital practice of thirty years; and the truths that such numbers point out will be more likely to become apparent from such high figures than from the smaller calculation hitherto published. The tables marked IV, V, VI, show the rate of mortality in the three different periods of life; that is, before and after twenty years of age, and over forty years. As Mr. Bryant's single table includes all ages, it has not been possible to combine the two periods of fifteen years, and so to obtain a more accurate result in point of difference of age.

The causes for the operations are termed primary, or amputation for accident during the first twenty-four hours; secondary, or after the first twenty-four hours; and pathological, or for

disease; while operations of expediency include those for deformities, new growths, &c. Under "leg" is included amputation at the knee; and under "forearm," at the elbow and wrist. The percentages represent the deaths.

Separate classes have been made for cases of amputation for acute suppuration; for double amputations; and for reamputations.

By a comparison of Tables I and II the total number of cases operated upon will be seen, as might be expected, to be greater in the latter fifteen years than in the former, but that the total rate of mortality should be one third higher might not be so readily anticipated, considering the almost yearly improvements in the dressing of wounds, and in the general hygienic condition of the patients. The cause of this increase is, however, traceable to one class of cases. The primary amputations in both tables yield an identical percentage, while the secondary and those of expediency are so nearly alike as to be of themselves insufficient to account for the difference. The contrast is first seen in the pathological amputations: here in the last fifteen years the rate of mortality has more than doubled. The explanation of this is probably to be found in the fact that excision of joints has removed from the field of amputation many limbs that in former years would have been sacrificed, and thus only the worst cases of joint disease, in which from the nature of the local affection or from the general condition of the patient a conservative operation is inadmissible, are left, and which are therefore often not predisposed toward recovery. In amputations through the arm and thigh, as representing the elbow and knee respectively, where resections are most frequently performed, the rate of mortality is considerably higher in Table II than in Table I; while in the case of the leg the increased number of deaths may perhaps be related to the increasing spirit of conservatism in surgery, and notably to the introduction of skin transplantation, whereby cases of extensive chronic ulceration, in which the limbs were formerly condemned and amputated, however well they might be disposed toward subsequent recovery, are now healed, or at least again rendered serviceable to the patient. In this way a fruitful source of cases of cure after amputation of the leg is excluded from more recent statistics.

All accidents taken together for the times represented by the first two tables give the following results :

1845-59	.	.	Cured	55, died	45, or 1 in 2·2, or 45· per cent.
1860-74	.	.	„	122, „	112, or 1 in 2·8, or 47·8 „

or nearly half of the traumatic amputations is lost.

Table III gives the results of 859 cases, and shows the order of mortality for all amputations, at all ages, to be :

Pathological	.	.	.	.	.	21·1 per cent.
Expediency	.	.	.	.	.	26·8 „
Primary	.	.	.	.	.	43·8 „
Secondary	.	.	.	.	.	56·3 „

and the rate of mortality, under the same circumstances, to be 31·9 per cent., or 1 in 3·1.

Amputations of the lower extremity, excepting the rare operation of disarticulation at the shoulder-joint, surpass those of the upper extremity in point of mortality : amputation of the arm standing 10 per cent. lower than that of the thigh or leg, while that of the forearm is but half as fatal. The same proportionate result comes out in the statistics published by M. Le Fort¹ from cases taken from all the Paris hospitals between 1861-63, as is seen in the following table :

		Guy's, 1845-74.		Paris Hospitals, 1861-63.
Thigh	.	35·6 per cent.	...	67·2 per cent.
Leg	.	35·7 „	...	61·9 „
Arm	.	26·8 „	...	54 „
Forearm	.	16·7 „	...	33·3 „

The greater actual mortality in Paris is ascribed by Le Fort to the absence of the better hygienic arrangements, and the more careful nursing found in English hospitals.

The total number of traumatic amputations for the thirty years is 384, of which 157 died, showing a mortality of 47 per cent., or 1 in 2·01.

From a comparison of Tables IV, V, VI, it will be seen that the mortality in primary amputations increases as the age, the percentage of deaths in each of the last two periods of twenty years being nearly double that of the one preceding.

¹ ' Médecine Opératoire par Malgaigne,' 8me édition, par Le Fort, p. 504.

Secondary amputations are less fatal during adult life than before or after; the difference between those of the first two periods of life is, however, slight, but the deaths markedly preponderate at forty years and over.

Pathological amputations are less fatal before twenty years than later in life: the mortality in the last two periods being nearly the same. This fact is the same with that deduced by Mr. Bryant; but while he shows, from a total of 68 cases, that these amputations in early life are thrice as successful as later on, Table IV, from a total of 81 cases, makes them but twice as favorable. Malgaigne found pathological amputations before five years to be very fatal, two out of four dying; but between five and fifteen years the results were more favorable: there were but fifteen deaths for fifty-three operations.¹

Before twenty years of age amputations of expediency are nearly 15 per cent. more fatal than later on.

The total mortality of all cases of amputation taken together increases 10 per cent. with each ascending period of life, so confirming Mr. Holmes's results; while that for all traumatic amputations increases at just double this rate for each twenty years. Thus:

Amputations for all accidents.

Up to 20 years	.	.	.	.	53 cases, 13 died, or 24·5 per cent.
20—40 years	.	.	.	95 "	39 " or 41·05 "
Over 40 years	.	.	.	86 "	60 " or 69·7 "

These figures do not yield to youth the greatest mortality, as was stated by Malgaigne: his remark upon traumatic amputations being "*Aucun âge n'y résiste moins que l'enfance.*"

For acute suppuration of the knee-joint three cases of amputation through the thigh are specified, at thirty-two, twenty-two, and fifteen years of age. The first child died of phlebitis, the others recovered.

Reamputation for irritable stump was successful in all four cases; three being of the leg, and aged forty-four, thirty-five, and forty-nine years, and one at fifty-four years, of the humerus; while amputation at the shoulder-joint for re-

¹ Op. cit., p. 491.

current disease in stump of arm was fatal to a man aged fifty-three.

Of fifteen double amputations for accident only two recovered, and the ages varied from five to seventy-five years. The recoveries were after amputation through the thigh and leg at twenty-seven years, and through the thigh and arm at twenty years of age. Such a high mortality is readily understood considering the amount of mechanical violence to which the patient must have been subjected in order to necessitate amputation of two limbs.

Statistics of operations, such as are now given, have a certain value of their own, but can after all represent only an approximation to the truth which they at first sight may seem to establish, it being quite impossible to represent by figures all those many and important accidents that are so often the determining causes in turning the balance in favour of or against the ultimate success of any particular case or class of cases.

TABLE I.—*Amputations.* (Mr. Bryant.)

1845-59 inclusive. All ages.	Primary.			Secondary.			Pathological.			Expediency.			Total.		
	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Total.	Cured.	Per cent.
Thigh	8	12	60 or 1 in 1.5	1	3	75 or 1 in 1.3	82	18	18 or 1 in 5.5	13	6	31.57 or 1 in 3.16	143	104	27.27 or 1 in 3.6
Leg	9	15	62.5 or 1 in 1.6	4	8	66.6 or 1 in 1.5	36	3	7.7 or 1 in 13	2	4	6.66 or 1 in 1.5	81	51	37 or 1 in 2.7
Foot.....	1	—	—	—	—	—	5	—	—	—	—	—	6	6	—
Shoulder ...	2	—	—	—	—	—	—	—	—	1	—	—	3	3	—
Arm.....	10	3	23 or 1 in 4.33	—	1	20 or 1 in 5	10	—	—	3	4	—	31	27	12.9 or 1 in 7.7
Forearm ...	13	3	18.7 or 1 in 5.3	3	—	—	13	—	—	4	—	—	36	33	8.3 or 1 in 12
Total ...	43	33	43.4 or 1 in 2.3	13	13	50 or 1 in 2	146	21	12.57 or 1 in 8	23	10	30.8 or 1 in 3.3	300	224	25.3 or 1 in 3.9

TABLE II.—Amputations.

1860-74. Total for 16 years. All ages.	Primary.			Secondary.			Pathological.			Expediency.			Total.			
	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Total.	Cured.	Died.	Per cent.
Thigh	14	14	50 or 1 in 2 63·6	7	22	75·8 or 1 in 1·3 46·1	94	48	33·8 or 1 in 2·9 18·8	19	9	12·1 or 1 in 3·1 20·8	227	184	93	40·9 or 1 in 2·3 36·2
Leg	32	37	1 in 1·8 or 25	14	12	1 in 2·1 or 6·6	58	13	1 in 5·4 or 6·6	19	5	1 in 4·8	190	123	67	1 in 2·8 or 11·5
Foot.....	6	2	1 in 4 or 43·8	—	—	—	14	1	1 in 15	3	—	—	26	23	3	1 in 8·6 or 50
Shoulder ...	4	3	1 in 2·3 or 37·5	—	—	—	—	—	—	—	1	100 or 1 in 1 28·5	8	4	4	1 in 2 or 33·3
Arm	20	12	1 in 2·8 or 15	6	4	40 or 1 in 2·5 60	9	2	18·1 or 1 in 5·6 26·6	5	2	1 in 3·6 or 12·5	60	40	20	1 in 3 or 22·9
Forearm ...	17	3	1 in 6·6 or 1 in 1·6	2	3	1 in 1·6	11	4	1 in 3·7	7	1	1 in 8	46	37	11	1 in 4·3 or 35·4
Total ...	93	71	43·2 or 1 in 2·3	29	41	58·5 or 1 in 1·7	186	68	26·7 or 1 in 3·7	53	18	25·3 or 1 in 3·8	559	361	198	1 in 2·8

TABLE III.—Amputations.

1845-74. Total for 30 Years. All ages.	Primary.			Secondary.			Pathological.			Expediency.			Total.		
	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.
Thigh	22	26	54.1 or 1 in 1.3	8	25	75.7 or 1 in 1.3	176	66	27.7 or 1 in 3.6	32	15	31.9 or 1 in 3.1	238	132	35.6 or 1 in 2.8
Leg	41	52	55.9 or 1 in 1.7	18	20	52.6 or 1 in 1.9	94	16	14.5 or 1 in 6.8	21	9	30 or 1 in 3.3	174	97	35.7 or 1 in 2.7
Foot	7	2	22.2 or 1 in 4.5	—	—	—	19	1	5 or 1 in 20	3	—	—	32	3	9.3 or 1 in 10.6
Shoulder ...	6	3	33.3 or 1 in 3	—	—	—	—	—	—	1	1	60 or 1 in 2	7	4	86 or 1 in 2.7
Arm	30	15	33.3 or 1 in 3	10	5	33.3 or 1 in 3	19	2	9.5 or 1 in 10.5	8	2	20 or 1 in 5	67	24	28.3 or 1 in 3.7
Forearm ...	30	6	16.6 or 1 in 6	5	3	37.5 or 1 in 2.6	24	4	14.2 or 1 in 7	11	1	8.3 or 1 in 12	70	14	16.6 or 1 in 6
Total ...	136	104	43.3 or 1 in 2.3	41	53	56.3 or 1 in 1.7	332	89	21.1 or 1 in 4.7	76	28	26.8 or 1 in 3.7	585	274	31.9 or 1 in 3.1

TABLE IV.—Amputations.

1860-74 inclusive. To 20 years of age, inclusive.	Primary.			Secondary.			Pathological.			Expediency.			Total.			
	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Total.	Cured.	Died.	Per cent.
Thigh	3	1	25 or 1 in 4	3	2	50 or 1 in 2	47	11	18·9 or 1 in 5·2	5	3	37·5 or 1 in 2·6	74	57	17	22·9 or 1 in 4·3
Leg	9	1	10 or 1 in 10	2	1	33·3 or 1 in 3	16	2	11·1 or 1 in 9	5	2	98·6 or 1 in 3·5	38	32	6	15·7 or 1 in 6·3
Foot.....	4	—	—	—	—	—	2	—	—	—	—	—	6	6	—	—
Shoulder ...	2	1	33·3 or 1 in 3	—	—	—	—	—	—	—	—	100 or 1 in 1	4	2	2	50 or 1 in 2
Arm	8	3	27·2 or 1 in 3·6	1	2	66·6 or 1 in 1·5	—	—	—	3	—	—	16	11	5	31·2 or 1 in 3·2
Forearm ...	7	—	—	2	2	50 or 1 in 2	3	—	—	1	1	50 or 1 in 2	16	13	3	18·7 or 1 in 5·3
Total ...	33	6	15·3 or 1 in 6·5	7	7	50 or 1 in 2	68	13	16·04 or 1 in 6·2	13	7	35 or 1 in 2·8	154	131	23	31·4 or 1 in 4·63

TABLE V.—*Amputations.*

1860-74 inclusive. 21-40 years of age, inclusive.	Primary.			Secondary.			Pathological.			Expediency.			Total.			
	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Total.	Cured.	Died.	Per cent.
Thigh	7	7	50 or 1 in 2 45.1	4	9	69.2 or 1 in 1.4 27.2	30	28	48.4 or 1 in 2.07 7.1	9	4	30.7 or 1 in 3.3 16.6	98	50	48	48.9 or 1 in 2.04 25.8
Leg	14	13	or 1 in 2.07 66.6	8	3	or 1 in 3.6	28	2	or 1 in 14	5	1	or 1 in 6	72	53	19	or 1 in 3.7 16.6
Foot.....	1	2	or 1 in 1.5	—	—	—	6	—	—	3	—	—	12	10	2	or 1 in 6
Shoulder ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Arm.....	9	2	18.1 or 1 in 5.5 23.07	3	—	—	4	1	20 or 1 in 5 50	2	1	33.3 or 1 in 3	22	18	4	18.4 or 1 in 5.5 26.8
Forearm ...	10	3	or 1 in 4.3	—	—	—	2	2	or 1 in 2	2	—	—	19	14	5	or 1 in 3.8
Total ...	41	27	39.7 or 1 in 2.5	15	12	44.4 or 1 in 2.2	68	33	32.6 or 1 in 3.06	21	6	22.2 or 1 in 4.5	223	145	78	34.9 or 1 in 2.8

TABLE VI.—Amputations.

1860-74 inclusive. Over 40 years of age.	Primary.			Secondary.			Pathological.			Expediency.			Total.			
	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Cured.	Died.	Per cent.	Total.	Cured.	Died.	Per cent.
Thigh	4	6	60 or 1 in 1.6 71.7	1	11	91.6 or 1 in 1.09	17	9	34.6 or 1 in 2.9	5	2	28.5 or 1 in 3.5 18.1	55	27	28	50.9 or 1 in 1.9 58.1
Leg	9	23	or 1 in 1.4	4	8	66.6 or 1 in 1.5	16	9	or 1 in 2.7 14.2	9	2	or 1 in 6.2	79	37	42	or 1 in 1.8 12.5
Foot.....	1	—	—	—	—	—	6	1	or 1 in 7	—	—	—	8	7	1	or 1 in 8 50
Shoulder ...	2	2	50 or 1 in 2	—	—	—	—	—	—	—	—	—	4	2	2	or 1 in 2 50
Arm.....	3	7	70 or 1 in 1.4	2	2	50 or 1 in 2	5	1	16.6 or 1 in 6	1	1	50 or 1 in 2	22	11	11	or 1 in 2 23.07
Forearm ...	—	—	—	—	1	100 or 1 in 1	6	2	25 or 1 in 4	4	—	—	13	10	3	or 1 in 4.3
Total ...	19	38	66.6 or. 1 in 1.5	7	23	75.8 or 1 in 1.3	50	23	30.5 or 1 in 3.2	19	5	20.8 or 1 in 4.8	182	95	87	47.8 or 1 in 3.09

FIFTH REPORT
OF THE
GUY'S HOSPITAL LYING-IN CHARITY,
FROM OCTOBER 1, 1863, TO SEPTEMBER 30, 1875.
COLLATED FROM THE RECORDS
By A. L. GALABIN, M.D.

PRESENTED
By J. BRAXTON HICKS, M.D., F.R.S., AND A. L. GALABIN, M.D.

INTRODUCTION.

THIS, the fifth report of the Guy's Hospital Lying-in Charity, extends over a period of twelve years, a longer time than that included in any previous report. The number of cases attended in each year has also increased, and thus the number of deliveries included in the present summary, namely, 23,591, exceeds the sum total of those in the first three septennial reports, which was 22,498.

The plan followed in the drawing up of the last report (see 'Guy's Hospital Reports,' 1864) has, in the main, been adopted in this, but some minor alterations have been made. Owing to the greater extent of the material, a part of it has been given in a more condensed form, in order to obtain space to record somewhat in detail the more interesting or important cases, such as those of eclampsia, placenta prævia, or extreme disproportion between the fœtus and the maternal passages. Thus the forceps cases have been arranged in a tabular form

and only a few of them are reported more in detail. Again, out of the cases of version for mal-presentation a small number only have been selected for record.

In presenting the present report, it may be well to make a brief statement of the mode in which the lying-in charity is at present conducted. The district comprised by it lies within a radius of about a mile from the hospital, and the patients are attended at their own homes by the students. A certain number of these, who have already attended a course of lectures on midwifery, are appointed extern obstetric attendants for each month. They reside close to the hospital, and are expected to abstain from visiting the post-mortem and dissecting rooms while they are attending midwifery cases. Two senior students, who have obtained legal qualification to practise, are appointed resident obstetric assistants, and hold office each for one month as junior, and one month as senior. They live within the walls of the hospital, and are ready at all times to assist the junior students. The assistant obstetric physician is sent for to superintend all cases in which any obstetric operation is performed.

THE FIFTH REPORT OF THE LYING-IN CHARITY,

Embracing a period of Twelve Years from October, 1863, to the end of September 1875.

The total number of women attended during the twelve years of whom record is preserved is 23,591.

The total number of children born is 23,811. Of these 22,838, or 95.92 per cent., were born alive: 973, or 4.08 per cent., were stillborn.

In 23,720 of whom the sex is mentioned 12,630 were males, 11,090 were females, or as 100 to 88.

TABLE I.—*Presentations under which the Living Children were born.*

Out of 22,747, of whom mention is made, 12,057 were males, 10,690 were females, or as 100 to 89.

	Males.		Females.		Total.	Per cent.
Vertex . . .	11,797	...	10,438	...	22,235	= 97·75
Vertex and hand . .	24	...	22	...	46	= ·20
Breech . . .	114	...	131	...	245	= 1·08
Foot . . .	49	...	52	...	101	= ·44
Face . . .	49	...	30	...	79	= ·34
Upper extremity . .	9	...	5	...	14	= ·06
Transverse . . .	1	...	4	...	5	= ·02
Brow . . .	9	...	5	...	14	= ·06
Funis . . .	5	...	3	...	8	= ·04
	<hr/> 12,057		<hr/> 10,690		<hr/> 22,747	

TABLE II.—*Presentations under which the Stillborn Children were delivered.*

Of these, 573 were males and 400 females, or as 100 to 69.

	Males.		Females.	Total.	Per cent.
Vertex { Full term . . . 331 } 389 { Full term . . . 210 } 238 ... 627 = 64·4					
Vertex { Decomposed . . . 16 } { Decomposed . . . 16 }					
Vertex { Premature . . . 42 } { Premature . . . 12 }					
Vertex and hand . . . 6 2 ... 8 = ·8					
Breech { Full term . . . 62 } 70 { Full term . . . 69 } 74 ... 144 = 14·8					
Breech { Decomposed . . . 5 } { Decomposed . . . 2 }					
Breech { Premature . . . 3 } { Premature . . . 3 }					
Foot { Full term . . . 35 } 42 { Full term . . . 34 } 42 ... 84 = 8·6					
Foot { Decomposed . . . 1 } { Decomposed . . . 4 }					
Foot { Premature . . . 6 } { Premature . . . 4 }					
Face 4 3 ... 7 = ·7					
Upper extremity . . . 26 12 ... 38 = 3·9					
Transverse 6 3 ... 9 = ·9					
Brow 1 1 ... 2 = ·2					
Funis { With vertex . . . 22 } 29 { With vertex . . . 14 } 25 ... 54 = 5·5					
Funis { With breech . . . 2 } { With breech . . . 0 }					
Funis { With foot . . . 2 } { With foot . . . 4 }					
Funis { With arm . . . 3 } { With arm . . . 5 }					
Funis { Transverse . . . } { Transverse . . . 2 }					
	<hr/> 573		<hr/> 400	<hr/> 973	

TABLE III.—*Showing the proportionate number of the several presentations for the whole number of Children, and the percentage of Children stillborn under each presentation.*

	Per cent.		Percentage stillborn.
Vertex . . .	22,980 = 96·9	—	2·7 = 1 in 37
Vertex and hand .	54 = ·22 = 1 in 439	...	14·8 = 1 in 6·7
Breech . . .	389 = 1·6 = 1 in 61	...	36·9 = 1 in 2·7
Foot or knee . .	185 = ·77 = 1 in 128	...	45·3 = 1 in 2·2
Face . . .	86 = ·36 = 1 in 276	...	7·9 = 1 in 12·6
Upper extremity .	61 = ·25 = 1 in 388	...	75·0 = 1 in 1·3
Transverse . . .	16 = ·07 = 1 in 1482	...	68·7 = 1 in 1·5
Brow . . .	16 = ·07 = 1 in 1482	...	12·5 = 1 in 8
Funis . . .	62 = ·26 = 1 in 383	...	87·1 = 1 in 1·1

The death rate in children has shown a progressive improvement. In the present report it is only 4·08 per cent.; in the last report of nine years it was 4·6; while in the preceding twenty-one years it was 5·2. It will be seen, however, from Table III that there is a high mortality among the children in cases of pelvic, arm, transverse, or funis presentations. This is partly due to the fact that patients are often very late in sending for assistance under such circumstances, and partly to inexperience of the attendants in the management of extraction after version, or when the presentation has been pelvic. Taking foot and breech presentations together the children stillborn are in the proportion of 1 in 2·5. In the last report the proportion was 1 in 2·7.

Twin Cases.

Of twin cases there were 220, or about 1 in 107 of the whole number of women delivered, or about ·93 per cent.

No. of cases.	Both males.	Both females.	One of each.
220	84	61	75

Presentations.

Vertex in both	118
Vertex and breech	37
Vertex and foot	38

Breech in both	8
Foot in both	6
Foot and breech	8
Vertex and upper extremity	5

In a few cases of which record is preserved as to the condition both of membranes and placenta, no relation seems to be shown between the sex of the children, and the fact of the amniotic cavity or placenta being double or single. This will be seen in the following instances :

CASE 1.—Both female. Two amniotic cavities ; large conjoined placenta.

CASE 2.—Male and female. Two amniotic cavities ; one placenta.

CASE 3.—Both male. Two amniotic cavities ; two placentæ connected by membrane.

CASE 4.—Male and female. Two amniotic cavities, and two placentæ.

CASE 5.—Both female. Single placenta and amniotic cavity.

CASE 6.—Male and female. Two amniotic cavities ; single placenta.

CASE 7.—Male and female. Single placenta and amniotic cavity.

Triplet Case.

Only one case of triplets occurred. Two children were males, and one female. The first and second presented by vertex, and were living. The third presented by right arm and chest, delivered by version, stillborn.

Face Presentations.

86 cases occurred, and 7 of the children were stillborn. All were delivered by natural efforts, except one, which was extracted by version, and was living. (Vide Version for protracted labour, Case 8.)

Funis Presentations.

The number of cases in which the funis presented was 62 ; 8 of the children were living and 54 stillborn. In many of

the cases the funis had ceased to pulsate before the arrival of assistance. In 11 cases the funis was prolapsed with a presentation of the upper extremity or transverse presentation. In these version was performed, but only one of the children was living. In 6 cases version was performed for prolapse of the funis with vertex presentation, and one of the children was saved. In one, forceps were applied after forty-five hours' labour: the child was stillborn. In 6 cases the funis was successfully replaced, when prolapsed with a vertex presentation. It was pushed up by the fingers of one hand, while the other hand, used externally, pressed down the head into the brim, so as to prevent its return.

Brow Presentations.

The brow presented in 16 cases, and 14 of the children were born alive. Fourteen were terminated by natural efforts, the presentation being generally converted into a face. Version was performed once, and forceps were used once. These two cases are related below.

CASE 1.—Æt. 40; fourth confinement. The brow presented, the frontal bone being posterior, towards the left sacro-iliac synchondrosis. As no progress was made, internal version was performed under chloroform. The child's heart beat faintly on delivery, but it could not be restored. Mother did well.

CASE 2.—Æt. 37; ninth confinement. The brow presented, the frontal bone being towards the left foramen ovale. The head was arrested at the brim for six hours after the os was fully dilated. Long forceps were applied, and the child extracted by powerful traction. The presentation was converted into a face as the head descended. The forceps were removed when the outlet was reached, the head being transverse to the pelvis. The chin then rotated under the right pubic ramus. The tip of the upper blade of the forceps had pressed upon the larynx. The child was asphyxiated, and did not breathe independently until artificial respiration had been maintained for three quarters of an hour. It died in convulsions after twelve days. Mother did well.

Presentation of the Upper Extremity and Transverse Presentations.

The upper extremity presented in 61 cases, in 9 of which the funis was also prolapsed. There were 16 transverse presentations, 2 of them complicated by prolapse of the funis.

Taking the whole 77 cases together, 12 were completed by natural efforts. In 6 spontaneous evolution took place in the mode generally described, the arm and head remaining fixed until the breech had been expelled. The children were still-born; 3 of them were premature, 2 were twin children, and 1 was decomposed. In 4 cases spontaneous version occurred; the head receded to the fundus of the uterus, and living children were expelled by the breech. In 2 cases the head was driven down by the side of the arm, and the child expelled without assistance. One was stillborn; the other, a twin child, was living. In 2 cases spontaneous evolution appeared to have commenced, and was completed by artificial extraction.

In the remaining 63 cases the presentation was rectified by podalic version: 15 of the children were living and 48 were stillborn. In most instances there was no opportunity for interference until the arm had been driven down into the vagina, and version was performed by the internal method. There were 2 deaths among the mothers; one from septicæmia, which is recorded below, and one from ruptured uterus, in which the rupture took place before the arrival of assistance. (Vide Rupture of uterus, Case 7.) The cases which terminated naturally and a few others of interest are recorded.

CASE 1.—Æt. 30; fifth confinement; at sixth month of pregnancy. The child, a female, presented by the shoulder, but was easily expelled; stillborn.

CASE 2.—Æt. 33; fourth confinement. The second of twins presented by the arm and funis. Version was attempted under chloroform, but did not succeed, owing to the firm contraction of the uterus. The child, a female, was then extracted by artificial evolution. Mother did well.

CASE 3.—Æt. 26; fifth confinement. The child, a female, presented by the arm, and was expelled by spontaneous evolution. The head was pulpy and decomposed, and the

child seemed to have been dead about two weeks. . Mother did well.

CASE 4.—Æt. 24; third confinement. The second of twins, a female, presented by the arm and thorax. The arm being drawn forward, the head went up, spontaneous version took place, and the child was born alive.

CASE 5.—Æt. 22; first confinement. The second of twins, a male, presented by the shoulder, and was expelled dead by spontaneous evolution.

CASE 6.—At seventh month of pregnancy. Child presented by shoulder, and was expelled dead by spontaneous evolution.

CASE 7.—Æt. 26; third confinement. The right shoulder presented, and the head was resting upon the brim, above the pubes. After several hours the head receded, spontaneous version took place, and a living male child was expelled.

CASE 8.—Æt. 20; first confinement. A hand presented. Spontaneous version took place, and a living male child was expelled by the breech.

CASE 9.—Æt. 28; fifth confinement. The second of twins presented by the hand, and was expelled dead by spontaneous evolution.

CASE 10.—Æt. 38; eighth confinement. The elbow presented, and was driven down to the ostium vaginæ, the uterus contracting very powerfully; pulse 120. While preparations were being made for version the head came down by the side of the arm, and a dead male child was expelled without assistance. Mother had febrile symptoms on the fourth day; pulse 120; temperature 103°. Subsequently she had inflammation about several joints, and was removed to the hospital, where she recovered.

CASE 11.—Æt. 26; fourth confinement. The second of twins presented by the arm, and the hand came down external to the vulva. The head was driven down by the side of the arm, and a living female child delivered without assistance.

CASE 12.—Æt. 32; seventh confinement. The shoulder presented at first, and spontaneous version took place. The shoulder, side, hip and buttock were felt successively at the os uteri, until the breech presented. A living male child was then delivered naturally.

CASE 13.—Æt. 28; fifth confinement; at seventh month

of pregnancy. The child, a female, presented by the left shoulder, and was expelled dead by spontaneous evolution.

CASE 14.—Æt. 33; eighth confinement; at sixth month of pregnancy. The right arm presented, and the sternum of the child was also driven low down. The uterus was very firmly contracted. Evolution was assisted by hooking two fingers over the pelvis of the child. It was a male, and dead.

Version for Mal-presentation.

CASE 1.—Æt. 32; ninth confinement. On three previous occasions version had been performed for mal-presentation, the pelvic brim being contracted. The left arm and shoulder presented, the abdomen being anterior, and the head in the left iliac fossa. Version was performed under chloroform, but much traction was required to bring the head through the brim, and the child, a male, was stillborn. Mother did well.

CASE 2.—Æt. 43; tenth confinement. Nine of the previous labours had been abnormal, and she had been four times delivered by version. The conjugate diameter of the brim was contracted. The left elbow presented, and the woman had been in labour about ten hours. Version was performed with difficulty on account of the rigid state of the uterus. Very strong traction was required to bring the head through the brim, and the vertebral column of the child gave way. It was a female, but the head was much ossified. Mother did well.

CASE 3.—Æt. 28; third confinement. The membranes had ruptured thirty-six hours previously, but there had been labour pains for twelve hours only. The patient did not send for assistance until the hand was expelled outside the vulva. Version was performed under chloroform without very great difficulty, and a dead male child delivered. The pelvis was roomy. Mother did well.

CASE 4.—Æt. 34; fourth confinement. An arm and face presented. Labour had commenced twenty-four hours before, and for more than six hours the pains had been very vigorous. The pulse had risen above 120. Version was performed under chloroform, and a dead female child delivered. After delivery the pulse was 90, temperature 99°. On the third day she was

attacked with pain and tenderness of the abdomen, and the lochia became scanty and offensive; pulse 104; temperature 103·9°. On the evening of the fourth day pulse was 132; temperature 102·6°. On the eighth day diphtheritic patches were seen in the throat, and she died the same evening.

Forceps Cases.

There has been some gradual increase in the relative number of forceps cases. Thus, in the last report, protracted labour was terminated by forceps in 0·48 per cent. of the cases: in the preceding twenty-one years the corresponding percentage was 0·27 for forceps alone, and 0·44 for forceps and vectis together. Out of the 23,591 deliveries included in the present report, 121 protracted labours were terminated by forceps, or 1 in 197, or about 0·51 per cent. The proportion of craniotomy cases has undergone a corresponding diminution, being 0·36 per cent. in the first twenty-one years, 0·12 per cent. in the next nine, and 0·07 per cent. in the last twelve. It will be seen that the number of forceps cases, namely, 0·51 per cent., is still very small, as judged by the standard of modern practice, and it may be of interest to estimate the effect of this sparing use of instruments upon the maternal mortality. It is evident that this is to be judged of, not from the proportions of deaths among the forceps cases, but rather from the ratio of the whole number of deaths in cases of protracted labour to the total number of deliveries. Out of the 121 forceps cases, five of the mothers died, one from hæmorrhage, one undelivered, and three from septicæmia. If to these be added six deaths after craniotomy, two after version for protracted labour, four from rupture of the uterus or vagina after powerful labour pains, and also two from septicæmia and one from hæmorrhage which occurred after tedious labour, we shall have twenty deaths only after difficult labour out of the whole 23,591 deliveries. This gives a proportion of 0·08 per cent. With regard to the mortality among the children, it is probable that some might have been saved by an earlier application of instruments; but a general mortality of 4·08 per cent., and one of only 2·7 per cent. in vertex presentations, appears to be not unsatisfactory. In the

last report the mortality in vertex presentations was 2·9 per cent.

Of late, long curved forceps, of Dr. Barnes' pattern, have been generally used even when the head has been arrested at or near the outlet. Thus, out of 75 cases during the last six years, short forceps were used only four times; but in the 46 cases which occurred during the first six years included in the report, short forceps were chosen fifteen times. About the middle of the twelve years a pair of forceps having longer handles, and less yielding in the blades than those previously used, was procured, and the use of these has almost superseded the resort to version in cases of contracted pelvis. Thus, in the first half of the period, delivery was effected by version in 13 cases of protracted labour, in five of which forceps had first been tried in vain. The children were living in 10 of the 13 cases, and in three out of the five in which forceps had failed. In the latter half of the period version was only once successful, and the child in that case was not saved, while the mother afterwards died from pneumonia. During the same time delivery was effected by forceps seventeen times, when the head was arrested at or above the brim, and fifteen of the children were saved; while, during the first half of the period, forceps were successful only seven times under such circumstances, and only three of the children were living. In all the 24 cases in which long forceps were successful when the head was arrested at or above the brim, the mothers did well. Out of the 14 cases of version under similar circumstances, there was one in which the placenta was adherent, and pelvic cellulitis occurred; a second, in which the placenta was also adherent, post-partum hæmorrhage took place, and the mother died after three weeks with signs of pneumonia; a third, in which the mother died on the seventh day from pneumonia. It would seem, therefore, as far as any inference can be made from these cases, that, if the forceps be sufficiently powerful, their use when the head is arrested above the brim is safer than version both for mother and child, and that it is desirable always to resort to them first.

A tabular statement is appended of all the forceps cases, and details of a few of the more important. In the table the cause of interference is classified under the heads of disproportion of head to pelvic passages (Dis.), inertia (In.), rigidity of

cervix uteri or vagina (Rig.), and occipito-posterior position of head (O. P.). In some cases, in which contraction of the pelvic brim was recognised, forceps were applied before the os was fully dilated; but in only one instance, namely, Case 103, was this done at a time when the os was still so small as to offer great obstacle to the passage of the blades. The table does not include those cases in which the application of forceps was followed by version or craniotomy, nor four cases in which the child was extracted by forceps after rupture of the uterus or vagina had occurred, nor again those cases in which forceps were applied on account of eclampsia or accidental hæmorrhage. These will be found under their respective headings. Of the 121 children, 76 were males, of whom 52 were living and 22 stillborn; 47 were females, of whom 40 were living and 7 were stillborn

TABLE IV.—Tabular Statement of Forceps Cases.

No. of case.	Age.	Pregnancy.	Cause of inter-ference.	Duration of labour in hours.	Duration of expulsive stage in hours.	Hours arrested.	Position in pelvis reached by head.	Long forceps.	Short forceps.	Ligot administered previously.	Children.				Mothers.		Remarks.
											Living.		Stillborn.		Recovered.	Died.	
											M.	F.	M.	F.			
1	22	1	Rig. In.	24	...	...	In cavity	1	1	1	1	...	...	1	...	Child decomposed.	
2	28	3	Dis. In.	...	...	8	"	1	...	1	1	...	...	...	1	...	Conjugate diameter 3½ inches.
3	34	5	Dis. In.	...	12	...	"	1	...	...	...	...	...	...	1	...	
4	24	1	Dis.	...	...	...	"	1	...	...	...	...	...	...	1	...	
5	25	2	"	...	...	...	"	1	...	...	...	...	...	...	1	...	
6	26	2	"	88	...	1	Above brim	1	...	...	...	...	...	...	1	...	
7	30	8	"	...	...	...	In cavity	1	...	...	...	...	...	...	1	...	
8	30	5	"	...	...	...	Near outlet	...	1	...	...	...	...	...	1	...	
9	38	15	"	12	...	...	In cavity	1	...	...	...	...	...	...	1	...	
10	35	1	Rig.	24	...	...	High in cavity	1	...	...	...	...	...	...	1	...	Vide Obliteration of os, Case 1.
11	22	1	Dis.	...	...	...	In cavity	1	...	...	...	...	...	...	1	...	
12	28	2	"	...	12	8	Near outlet	...	1	...	...	...	...	...	1	...	
13	29	1	"	...	...	...	"	...	1	...	...	...	...	...	1	...	
14	26	1	"	...	14	6	At outlet	...	1	...	...	...	...	...	1	...	
15	24	1	Rig.	36	...	...	High in cavity	...	1	...	...	...	...	...	1	...	
16	22	1	Dis. Rig.	18	...	5	Near outlet	...	1	...	...	...	...	...	1	...	
17	28	7	...	...	...	...	In cavity	...	...	...	...	...	...	...	...	...	First of twins.
18	26	2	O. P.	12	...	...	At outlet	...	1	...	1	...	...	...	...	1	Applied after death of mother.
19	37	1	"	24	...	...	In cavity	...	1	...	1	...	...	...	1	...	
20	37	5	Dis.	20	...	...	Low in cavity	...	1	...	1	...	...	...	1	...	
21	23	1	"	29	17	4	At outlet	...	...	...	1	...	...	...	1	...	
22	26	3	"	...	...	...	In cavity	1	...	...	1	...	...	...	1	...	
23	35	9	"	15	...	...	At outlet	...	1	...	...	...	...	...	1	...	

TABLE IV (continued).

No. of case.	Age.	Pregnancy.	Cause of inter-ference.	Duration of labour in hours.	Duration of expulsive stage in hours.	Hours arrested.	Position in pelvis reached by head.	Long forceps.	Short forceps.	Ergot administered previously.	Children.				Mothers.		Remarks.
											Living.		Stillborn.		Recovered.	Died.	
											M.	F.	M.	F.			
24	38	4	Dis.	16	Above brim	1	..	1	..	1	..	1	1	Second of twins.	
25	25	1	"	..	..	..	In cavity	1	..	..	..	..	..	1	1
26	40	9	"	..	..	..	"	1	..	..	..	..	..	..	1
27	30	4	"	..	..	..	In cavity	1	..	..	..	..	..	1	1
28	39	11	"	..	..	..	At brim	1	..	..	..	..	..	1	1
29	30	3	"	17	..	..	In cavity	1	..	..	..	..	..	1	1
30	30	1	"	..	..	8	At brim	1	..	..	..	..	..	1	1
31	30	5	"	26	15	..	In cavity	1	..	..	..	..	..	1	1
32	22	2	"	..	..	..	Near outlet	..	1	..	..	..	..	1	1
33	28	8	"	..	..	..	In cavity	1	..	..	..	..	..	1	1
34	23	1	"	42	15	4	Low in cavity	1	..	..	..	..	1	1	1
35	35	9	"	10	6	6	Near outlet	..	1	..	..	..	1	1	1
36	19	1	"	..	..	6	At outlet	..	1	..	..	..	1	1	1
37	30	8	Rig. In.	..	8	..	At brim	1	1	..	..	..	1	1	1
38	38	6	O. P.	..	12	..	High in cavity	1	1	..	..	..	..	..	1
39	32	7	"	..	6	4	"	1	..	..	..	..	1	1	1
40	19	1	Rig.	21	..	5	At outlet	..	1	..	..	..	1	1	1
41	31	6	Dis.	46	..	6	In cavity	1	1	..	..	..	1	1	1
42	42	9	In.	..	..	..	At outlet	..	1	..	..	..	1	1	1
43	25	2	Dis.	..	..	..	In cavity	1	1	..	..	..	1	1	1
44	32	3	"	..	11	..	Above brim	1	1	..	..	..	1	1	1
45	22	1	"	..	..	..	In cavity	1	1	..	..	..	1	1	1
46	30	1	"	26	..	10	High in cavity	1	..	..	..	..	..	1	1

TABLE IV (continued).

No. of case.	Age.	Pregnancy.	Cause of inter-ferrence.	Duration of labour in hours.	Duration of expulsive stage in hours.	Hours arrested.	Position in pelvis reached by head.	Long forceps.	Short forceps.	Ergot administered previously.	Children.				Mothers.		Remarks.	
											Living.		Stillborn.		Recovered.	Died.		
											M.	F.	M.	F.				
80	35	4	Dis.	17	5	...	Above brim	1	...	...	...	...	...	...	1	...	Child only lived one day.
81	19	2	"	...	...	15	Near outlet	1	...	...	...	...	...	...	1	...	
82	34	1	"	...	12	6	In cavity	1	...	...	...	...	...	...	1	...	
83	37	9	Brow	12	...	6	At brim	1	1		...
84	23	1	Dis.	...	20	10	In cavity	1	1		...
85	39	11	"	12	...	6	At outlet	1	1		...
86	23	1	"	23	6	...	Low in cavity	1	1		...
87	19	1	O. P.	55	7	5	At outlet	1	1		...
88	36	1	Dis.	...	12	3	"	1	1		...
89	24	1	"	40	...	6	"	1	1		...
90	19	1	"	...	...	4	Low in cavity	1	...	...	...	...	...	...	...	1	...
91	39	6	"	...	...	5	In cavity	1	...	...	...	...	...	...	...	1	...
92	35	5	"	12	...	4	Near outlet	1	...	...	...	...	...	...	...	1	...
93	39	4	"	25	...	...	At brim	1	...	...	...	...	...	...	...	1	...
94	43	4	In.	12	3	...	In cavity	1	...	...	...	...	...	...	...	1	...
95	23	4	Dis.	...	6	2	At outlet	1	...	...	...	...	...	...	...	1	...
96	23	1	"	...	7	4	In cavity	...	1	...	...	...	...	...	...	1	...
97	39	5	"	...	...	5	"	1	...	...	...	...	...	...	...	1	...
98	26	6	"	...	...	...	"	1	...	...	...	...	...	...	...	1	...
99	25	1	"	...	...	14	Near outlet	1	...	...	...	...	...	...	...	1	...
100	37	12	"	14	7	...	In cavity	1	...	...	...	...	...	...	...	1	...
101	23	1	"	18	...	7	"	1	...	...	...	...	...	...	...	1	...
102	18	1	"	72	...	16	"	1	...	...	...	...	...	...	...	1	...
																	First of twins, hemorrhage after [delivery.	

103	40	7	Rig.	30	...	At brim	1	...	1	...	1	...	...	Applied before full dilatation of os.
104	39	8	Dis.	54	5	"	1	1	1	1	1	1	1	Applied before full dilatation of os.
105	19	1	O. P.	...	10	"	1	...	...	...	...	...	...	Applied before full dilatation of os.
106	40	9	Dis.	...	6	"	1	...	...	...	...	...	...	Applied before full dilatation of os.
107	18	1	"	10	4	High in cavity	1	1	1	1	1	1	1	Applied before full dilatation of os.
108	22	1	"	47	8	In cavity	1	...	...	...	...	...	...	Applied before full dilatation of os.
109	33	11	"	54	6	At brim	1	...	...	...	...	...	...	Applied before full dilatation of os.
110	37	16	"	72	3	High in cavity	1	...	...	...	...	...	...	Applied before full dilatation of os.
111	21	1	In. Dis.	56	8	Near outlet	1	...	...	...	...	...	1	Applied before full dilatation of os.
112	35	8	Dis.	...	7	In cavity	1	1	1	1	1	1	...	Applied before full dilatation of os.
113	23	1	"	...	...	"	1	...	...	...	...	...	...	Applied before full dilatation of os.
114	30	4	"	...	4	High in cavity	1	...	...	...	...	...	...	Applied before full dilatation of os.
115	30	1	In.	...	...	In cavity	1	...	...	...	...	...	...	Applied before full dilatation of os.
116	29	1	Dis.	...	5	At brim	1	...	...	...	...	...	...	Applied before full dilatation of os.
117	20	2	"	...	...	In cavity	1	...	...	...	...	...	...	Applied before full dilatation of os.
118	28	3	"	...	14	"	1	...	...	...	...	...	...	Applied before full dilatation of os.
119	33	6	"	...	6	At brim	1	...	...	...	...	...	...	Applied before full dilatation of os.
120	18	1	"	...	9	At outlet	1	...	...	...	...	...	...	Applied before full dilatation of os.
121	34	6	"	...	...	In cavity	1	...	...	...	...	...	...	Applied before full dilatation of os.

Second of twins.

CASE 6.—Æt. 26; second confinement. The first child was stillborn, after three days' labour. On this occasion the head was arrested above the brim. The conjugate diameter was estimated at three inches and a quarter, and the head was large. Long forceps were applied, and the head was drawn through the brim, and afterwards expelled naturally. Labour had lasted thirty-eight hours, and the child, a male, was dead. Mother did well.

CASE 12.—Æt. 28; second confinement. First child was stillborn, after a protracted labour. On this occasion expulsive pains had lasted twelve hours, and the head had been arrested eight hours, somewhat low in the cavity of the pelvis. Short forceps were applied, and a dead female child extracted without much difficulty. The mother afterwards vomited almost everything she took, and died on the sixth day. After death the abdomen was enormously distended.

CASE 17.—Æt. 28; seventh confinement. The mother died undelivered. The dead child, a male, was afterwards delivered by forceps, and the uterus was found to contain foetid gas. No rupture could be detected. No autopsy was permitted.

CASE 18.—Æt. 26; second confinement. The pubic arch was contracted. The head was in the third position, which failed to become converted into the second. At the outlet its position had become transverse. Labour had lasted twelve hours, and the pains were becoming sluggish. Ergot was administered, but no progress was made. Short forceps were applied with the blades adjusted to the sides of the head, one towards the sacrum, the other towards the pubes. The occiput was then rotated forwards, and the child extracted. It was a male, and living. Mother did well.

CASE 24.—Æt. 38; fourth confinement. Three former children were stillborn, and instruments had been used once. The head was arrested above the brim, and the sacrum was found to be unduly prominent. Ergot was given, but little progress was made. Long forceps were applied, but the shape of the pelvis made it impossible to lock them. The head was eventually brought through the brim by one blade, applied as a vectis, in the curve of the sacrum. The child, a male, was dead. Mother did well.

CASE 37.—Æt. 30; eighth confinement. The head was

arrested somewhat high in the cavity of the pelvis. Very strong pains had continued for six hours, and the pulse rose to 120; os fully dilated. Long forceps were applied under chloroform, and a dead male child delivered in about three quarters of an hour by powerful traction. Mother did well until the fifth day, when she had abdominal pain and the urine was retained. The bowels were obstinately confined, and remained so till her death on the seventh day.

CASE 40.—Æt. 19; stated to be pregnant for the first time. She had had a purulent vaginal discharge during the sixth and seventh months of pregnancy. Labour lasted twenty-eight hours, and the head was arrested at the outlet by cicatricial bands encircling the left side of the ostium vaginae. Short forceps were applied, and a living female child extracted. The cicatrix did not yield, but the perinæum was ruptured as far as the sphincter ani. Mother did well.

CASE 54.—Æt. 25; third confinement. The last child had been stillborn, extracted by forceps, and she had been recommended to have premature labour induced, but had gone on to full time. Conjugate diameter estimated at three inches and a half. The head had been arrested above the brim for twenty-two hours, notwithstanding strong pains. Long forceps were applied, and a living male child was extracted with unexpected ease. Mother did well.

CASE 64.—Æt. 43; sixth confinement. Forceps had been used twice before. The head was arrested above the brim, the conjugate diameter of which was estimated at a little less than three inches. The pelvis was rickety, the sacrum prominent, and the right pubic bone bent inwards. Long forceps were applied and a living male child delivered. Mother did well.

CASE 67.—Æt. 20; first confinement. The head was in the third position and was arrested high in the pelvis. Long forceps were applied, and it was delivered by powerful traction, continued for forty minutes. The child, a male, only lived a few minutes. Its head was of enormous size, and much distorted. The perinæum was ruptured by the head. Sutures were put in immediately, but it did not unite. Mother suffered from severe febrile disturbance for more than a fortnight, but ultimately recovered.

CASE 102.—Æt. 18; first confinement. When first seen the

patient was stated to have been in labour several days. Rhythmical pains had ceased six hours; the uterus was rigid; pulse 120; the head low in the cavity of the pelvis. The patient and her friends refused to allow the application of forceps, which was recommended; six hours later, when the pulse had risen to 140, consent was obtained for their use. A dead male child was then extracted by long forceps. The patient did fairly well, but at the end of a fortnight a vesico-vaginal fistula appeared, of size sufficient to admit two or three fingers.

CASE 108.—Æt. 40; seventh confinement. Patient complained of having suffered from prolapsus of the womb during pregnancy. The cervix was found greatly hypertrophied and indurated, and the os would not dilate. When labour had lasted thirty hours the os was still less than three inches in diameter. Long forceps were then applied. It was found impossible to pass the second blade through the os until chloroform had been administered, after which the cervix yielded readily. A dead male child was quickly delivered. Mother did well.

CASE 107.—Æt. 18; first confinement. Long forceps were applied at a somewhat early stage, about four hours after the os had become fully dilated, and before the pulse had become very rapid. The head was high in the cavity of the pelvis. Delivery was effected by traction at intervals for about half an hour. The perinæum, which was very rigid, was ruptured, and did not unite. The child, a male, was living. Mother suffered from severe febrile disturbance from the seventh to the twentieth day: the pulse rose to 184, and the temperature to 105°. Ultimately she recovered.

CASE 110.—Æt. 37; sixteenth confinement. Slight pains had lasted for three days, and when the os had become fully dilated the pulse was 120; membranes unruptured. The pains continued feeble after the rupture of the membranes, and three hours later long forceps were applied, the head being high in the pelvis. The head was delivered after half an hour's traction. Great difficulty was experienced in the delivery of the body, which was only effected by combined traction on the head and a handkerchief passed round the posterior axilla, and the humerus was broken in the process. The child, a male, was dead; it was very large, and its head firmly ossified. After delivery the pulse was 170, and there was some hæmorrhage.

Ergot was given, and the placenta removed by the hand. Next day the pulse was 120, and the patient ultimately recovered well.

CASE 111.—Æt. 21; first confinement; seduced. First stage of labour lasted forty-eight hours before the membranes ruptured. The pelvis was roomy, but the pains feeble. Eight hours after the rupture of the membranes the head was low down in the pelvis, but no further advance was made; pulse 108. Long forceps were applied, and a living male child was delivered very easily. The next day she was comfortable; pulse 88; temperature 98·6°. On the third day abdominal pain and distension came on; pulse 144; temperature 104°. Vomiting and diarrhoea were afterwards added, and she died on the seventh day.

Version for protracted labour, or contracted pelvis.

CASE 1.—Æt. 26; second confinement. Pelvis was obstructed by a tumour of fibrous character in the cavity of the sacrum. At the former confinement craniotomy was performed after four days' labour. On this occasion bipolar version was performed under chloroform as soon as the os was fully dilated. A female child was extracted, but was dead.

CASE 2.—Æt. 38; fifth confinement. The pelvis was contracted: conjugate diameter estimated at three inches. The first two children were small, and born naturally; the third was delivered by forceps; the fourth by craniotomy. Labour was induced by the introduction of dilating bags, when she had gone very nearly full time. Bipolar version was then performed under chloroform, and a living female child delivered.

CASE 3.—Æt. 33; ninth confinement. Instruments had been used six times previously. The head was arrested above the brim, which was contracted. Long forceps were applied, but the head was found so large that it was not considered justifiable to make traction. Bipolar version was then performed, and a dead male child extracted.

CASE 4.—Æt. 20; second confinement. Forceps were used at former labour. The head was arrested above the brim, and the sacrum was found to be unduly prominent. Bipolar

version was performed under chloroform, and a dead male child extracted.

CASE 5.—Æt. 40; eighth confinement. In last four labours had been delivered by instruments. The head was arrested above the brim, and long forceps were applied without effect. Version was then performed, and a living male child delivered.

CASE 6.—Æt. 37; fifth confinement. Conjugate diameter of pelvis estimated at three inches and a half. Forceps had been used at first labour. The head was arrested at the brim. Long forceps were applied under chloroform, but without avail. Internal version was then performed, and a living male child delivered. Some hæmorrhage took place, and the placenta was found adherent to the fundus, and had to be separated by the hand. The mother suffered from pelvic cellulitis, and was removed to the hospital, where she ultimately recovered.

CASE 7.—Æt. 20; first confinement. Pelvis contracted in conjugate diameter. The head was arrested above the brim, and long forceps were applied, but without avail. Version was then performed, and a male child extracted. It was asphyxiated, but was restored by artificial respiration.

CASE 8.—Æt. 40; second confinement. Instruments had been used at former labour. The face presented, and no progress was made, although pains were strong. The conjugate diameter was estimated at two inches and a half. Version was performed, and a female child delivered by great traction. It was asphyxiated, but was restored by artificial respiration.

CASE 9.—Æt. 27; second confinement. Conjugate diameter estimated at three inches and a quarter. The head was arrested above the brim in the fourth position. Version was performed under chloroform, and a living male child delivered by considerable traction.

CASE 10.—Æt. 33; sixth confinement. Head arrested high up. Living female child delivered by version.

CASE 11.—Æt. 22; second confinement. The first stage of labour was long protracted from extreme rigidity of the os uteri. Although chloroform was fully given, it could not be dilated more than up to the size of a crown-piece. Bipolar

version was then performed, and a living female child was soon delivered.

CASE 12.—Æt. 35; eighth confinement. The head became arrested when engaged in the brim, about fifteen hours after the rupture of the membranes. The pelvis was somewhat contracted. Bipolar version was performed under chloroform, and a living male child delivered.

CASE 13.—Æt. 34; eleventh confinement. Instruments were used at the ninth labour. Sacrum unduly prominent; conjugate diameter estimated at three inches and a quarter. The head was arrested at the brim, although the uterus acted strongly under the influence of ergot. Long forceps were applied, but without avail. A dead male child was then delivered by version. A good deal of post-partum hæmorrhage occurred, and the placenta was partially adherent. The mother had febrile symptoms, and died at the end of three weeks with signs of pneumonia.

CASE 14.—Æt. 38; first confinement. The head was arrested for six hours above the brim. Long forceps were applied, but without avail. A dead male child was then delivered by version. The mother had suffered for some time with chest symptoms; and after delivery double pneumonia set in, and she died on the seventh day.

Craniotomy.

The fetal skull was opened in 18 cases, or 1 in 1310, or about 0·07 per cent. In fifteen of these the operation was resorted to for want of due relation between the fetal head and maternal passages, in one for compound presentation of head and feet, in one for carcinoma of the cervix uteri, and in one for the delivery of an aftercoming hydrocephalic head. It was adopted after forceps alone in seven cases, after version alone in four cases, after forceps and version in two cases. In five of the cases some of the cranial bones were broken up and removed by craniotomy forceps, and in three the cephalotribe was used after perforation. The greatest want of adaptability was in a case in which the conjugate diameter of the pelvic brim measured two inches and a quarter. There were six deaths; three from septicæmia, two from exhaustion, and one from gangrene

and suppuration about the uterus. The following are the records of the cases.

CASE 1.—Æt. 32; second confinement. First child had been stillborn. Head arrested above brim for six hours. Conjugate diameter of pelvis estimated at three inches and a quarter. Version was performed under chloroform, and the occiput afterwards perforated. Extraction proved difficult, and the operation occupied three hours. On the evening of the second day pain and nausea commenced; on the third day there was tenderness of abdomen with tympanitis, and the lochia ceased; pulse 130. The following day she died. *Treatment.*—Calomel and opium.

CASE 2.—Æt. 22; second confinement. Female child. Mother did well.

CASE 3.—Æt. 26; first confinement. The first stage of labour was protracted, lasting five days, and the membranes ruptured early. The forehead was hitched above the pubes high up, the occiput posterior. A hand was behind it, and the funis prolapsed. Version was attempted, but the hand could not be introduced owing to the rigidity of the uterus. Long forceps were next applied, but failed to move the head. The head was then perforated through the posterior fontanelle, and drawn into the cavity of the pelvis by craniotomy forceps. Some pieces of bone were afterwards removed, and extraction completed by short forceps. Mother recovered without any bad symptom.

At the second confinement of the same patient, two years later, the head was arrested above the brim. Internal version was performed under chloroform, and a dead male child delivered.

CASE 4.—Æt. 27; second confinement. First labour had not been protracted beyond twelve hours. Dilatation stage lasted three days, and membranes ruptured at the end of two days, when the os was only the size of a shilling. The sacrum was very prominent; conjugate diameter about three inches and a half. The head was arrested when about halfway through the brim, and no foetal heart sounds could be heard. Long forceps were applied, but traction was of no avail. The head was then perforated between the blades, and drawn through the brim. The forceps were then removed; and the child, a male, was soon

expelled. It had a foetid odour, and had probably been dead as much as twelve hours. Mother did well.

CASE 5.—Æt. 32; sixth confinement. The head and feet of the child were both driven down into the vagina at the same time, and there became arrested. The head was perforated, and it was found necessary to break up the cranial bones, and extract them separately, before delivery could be accomplished. The child was a female. Mother did well.

CASE 6.—Æt. 40; ninth confinement. Long forceps were first applied, but without avail. The head, which was much ossified, was then perforated. The child was a male. Mother afterwards suffered from pelvic cellulitis and cystitis, but ultimately recovered.

CASE 7.—Æt. 22; first confinement. The dilatation stage was protracted, and lasted three days. The head became arrested about the middle of the cavity of the pelvis, and the pulse rose to 130. Forceps were first applied, but traction failed to move the child. The head was then perforated. The child was a male. Mother died from exhaustion eighteen hours after the operation. The pelvis appeared to be uniformly small, but not deformed.

CASE 8.—Æt. 24; first confinement. Membranes ruptured sixty hours after commencement of labour pains. After six hours more the os was found to be about the size of a crown piece, but readily dilatable, the head arrested above the brim by a prominent sacrum. The pains, which had been strong, were becoming very feeble. Long forceps were applied, but without avail. They were then removed, and version was effected without much difficulty. As it was still found impossible to draw the head through the brim, it was perforated behind the ear. The child, a male, was very large, cranial bones much ossified. The mother's pulse remained above 100 for three days, but after that she rapidly recovered. The use of the catheter was necessary for five days.

CASE 9.—Æt. 24; second confinement. First child had been born alive after twenty-four hours' labour. The pelvis was contracted; its conjugate diameter being not more than two inches and three quarters. The head became arrested above the brim, and it was considered safer to perform craniotomy at once.

The child, a male, was then extracted by long forceps. Mother did well.

CASE 10.—Æt. 20; first confinement. The pelvis was small in all its diameters; external antero-posterior six inches and a half; extreme external transverse nine inches and three quarters; between anterior superior spines of ilium seven inches and a quarter. The head became impacted in the brim of the pelvis, although the caput succedaneum reached nearly to the vulva. Long forceps were applied, and traction was made for half an hour without avail. The head was then perforated, and it was found necessary to remove nearly the whole of the calvarium before delivery could be effected. No chloroform was administered. The child was a male. Mother had some numbness and loss of power in right leg, but eventually recovered well.

CASE 11.—Æt. 49; fourth confinement; pregnant about seven months and a half. The breech of the child presented, and it was found impossible to draw the aftercoming head through the brim. A large tumour was also felt in the hypogastrium. A diagnosis of hydrocephalus was therefore made, and the occiput perforated. A gush of fluid followed, and the head was immediately born. Chloroform had been administered. There was considerable post-partum hæmorrhage, but the patient recovered well.

CASE 12.—Æt. 25; second confinement. The first child had been a female, and small. The sacrum was prominent; conjugate diameter estimated to be three inches and a quarter. The head was arrested for six hours above the brim. Long forceps were applied without avail. Version was then performed, but it was still impossible to extract the head. Ultimately it was perforated behind the ear, and the child, a male, was speedily born. Chloroform was administered throughout. Mother rapidly recovered.

CASE 13.—Æt. 22; first confinement. The pelvis was rachitic; conjugate diameter estimated at two inches and a quarter. The funis presented, and higher up the abdomen of the child could be felt. The legs were brought down, but the chin became fixed against the symphysis pubis. Perforation was then attempted, but could not be performed effectually, owing to the deformity of the pelvis. Some brain matter, however, escaped. The crotchet was next employed but without

avail. The body of the child was then removed; the cephalotribe was applied, and the head crushed twice. The cephalotribe was removed, as delivery could not be effected with it, and the head was at length extracted by powerful traction with the long forceps. The patient, during these proceedings, was kept under chloroform for an hour and a half. She recovered without any bad symptom.

CASE 14.—Æt. 32; first confinement. The pelvis was contracted; conjugate diameter estimated at three inches. The left arm and shoulder, with the funis, presented, and the uterus became firmly contracted round the child. Chloroform was administered, and the right knee brought down with much difficulty, but the head could not be made to recede from the right iliac fossa. Version was at length completed by bringing down the left foot also, but traction on the legs failed to bring the breech lower than the vulva. The arms could not be reached even after both abdomen and thorax had been eviscerated. After a vain attempt to pass the long forceps over arms and head together, the trunk was severed on a level with the ensiform cartilage, and the forceps reapplied. They slipped over the shoulders, however, just as the thorax began to appear externally. The arms were at length brought down by the aid of the crotchet, but the head separated at the root of the neck and remained behind. Long forceps were again tried in vain, and then the base of the skull was perforated, the forceps removed, and the head crushed by the cephalotribe, after which it was extracted without further difficulty. The whole process occupied about six hours, during the greater part of which time the patient was kept under chloroform. The child was a male. For the first three days the mother suffered from abdominal pain and vomiting, the temperature ranging between 104° and 107°, pulse about 180. On the seventh day temperature had become normal, milk and lochia were free, and she appeared to be doing well. On the tenth day, however, she was taken with shivering, febrile symptoms returned, and she died on the thirteenth day.

Post-mortem.—Pus was found in front of the bladder, and the internal surface of the uterus was gangrenous. No lesion of other parts. *Treatment.*—Quinine and opium.

CASE 15.—Æt. 22; first confinement; seduced. The head

was arrested above the brim, and the os did not become fully dilated. Labour had lasted thirty-six hours, the pulse had risen to 120, and uterine action had become continuous. Long forceps were applied with difficulty, owing to the condition of the os, but failed to move the head. It was then perforated between the blades, but traction still failed. The forceps were then withdrawn, and some pieces of bone removed with craniotomy forceps. The forceps reapplied brought the head down. Chloroform was used for two hours. The child was a male. The patient was in good condition after the operation, but the lochia rapidly became offensive, and she died thirty-three hours after.

Post-mortem.—The abdomen was distended, but there were no signs of peritonitis. There was a rent one inch and a half long in the cervix, not reaching the peritoneum. No other lesion was found, except a softened condition of the liver and spleen.

CASE 16.—Æt. 24; second confinement. Version was performed for prolapse of funis, but the head, being large, could not be drawn through the brim. The occiput was then perforated. The child was a male. Mother did well till fourth day, when temperature rose to 104°, pulse to 136, with pain and tenderness of abdomen; lochia offensive, but plentiful. She suffered from diarrhœa up to the thirteenth day. By the seventeenth day the temperature had become moderate, but bed-sores had appeared. On the twenty-fifth day there were symptoms of broncho-pneumonia, and she died on the thirty-first day, in the midst of a December fog. She was treated by antiseptic injections, opium, and large doses of quinine.

CASE 17.—Æt. 41; eleventh confinement. At the onset of labour it was found that there was advanced carcinoma of the cervix uteri. The whole length of the cervix was surrounded by a densely hard mass, and there was scarcely any dilatation even of the internal os. A softer mass infiltrated the anterior vaginal wall, and occupied the base of the bladder. The patient was removed to the hospital, and the greatest possible dilating force applied to the cervix for many hours by means of Barnes' bags. The os was at length dilated enough to admit three fingers, and the pulse had risen over 120. The head was then perforated through the anterior fontanelle, and the

cephalotribe repeatedly applied. The face was directed forwards, and great difficulty was found, on account of the contracted state of cervix, in carrying the blades far enough forward to crush the base of the skull completely, and so allow its extraction. The body was extracted without any very great difficulty. Chloroform was administered for nearly three hours. The mother recovered well from the effects of the operation, but after a fortnight it was found that the friable mass in the anterior vaginal wall had broken down, and a considerable opening existed into the bladder.

CASE 18.—Æt. 30; first confinement. The first stage of labour lasted four days, and when the os was fully dilated the pulse was 136, temperature 100·4°; tongue dry and brown; urine contained albumen in proportion of one fourth. Progress continued for an hour and a half, but the head was then arrested somewhat low in the cavity of the pelvis. Long forceps were applied, but failed to move it, and it was then perforated between the blades and extracted with ease. The os pubis was rostrated, and the diameter between the tubera ischii reduced. Next day the temperature was normal, but the pulse was 136, and the patient vomited everything. Vomiting continued, and she died on the third day.

Rupture of Uterus or Vagina.

Seven cases of this accident occurred, or 1 in 3371 deliveries. In two of them the pains were feeble from the first, in the other five they had been vigorous. In one of the latter an arm was presenting; the other six occurred in vertex presentation. The rent was between uterus and vagina in three cases, in all of which the pains had been powerful, in the front of the uterus in two cases, and at the side in two. In the last four cases its direction was longitudinal. Cæsarian section was performed after death in one case, but the child was not saved. The child was delivered after the occurrence of the rupture by forceps in four cases, by version in one, and by version followed by craniotomy in one. All the patients died, but one of them lived as long as four days after delivery.

CASE 1.—Æt. 40; thirteenth confinement. Spontaneous

rupture took place between uterus and anterior vaginal wall. Mother died undelivered. Cæsarian section was performed after death, but the child, a male, was dead.

CASE 2.—Æt. 40 ; ninth confinement. Each successive delivery had been more difficult than its predecessor, and forceps had been applied once. The head had been arrested above the brim for five hours, the pains frequent and strong ; pulse had reached 120. Suddenly the patient was seized with shivering and vomiting, and became collapsed. The head did not at first recede, but, when it was pushed aside, a stream of blood issued. Version was performed, and, as the head could not be drawn through the brim, the occiput was perforated. A large male child was delivered, and the mother died almost at the same moment. There was a rent four inches long in front of the uterus, midway between cervix and fundus. The intestines protruded into the vagina. The conjugate diameter of the pelvis was estimated at three inches.

CASE 3.—Æt. 30 ; fourth confinement. Instruments had been used in each previous labour. Membranes ruptured four hours after commencement of labour, when the os was only dilated to the size of a shilling. Pains were frequent and strong, except during a short interval of sleep, but the os did not become fully dilated for seventeen hours more, and the pulse had then reached 130. Six hours later the head had become arrested somewhat low down in the cavity of the pelvis, outside the uterus. Pains had ceased, and the woman was in a state almost of collapse ; pulse 140, scarcely perceptible. Forceps were applied and a dead male child extracted. The uterus was found to be ruptured, and more than half separated from the vagina. No sign had been noticed of the time when the accident happened. The patient gradually sank and died about sixteen hours after.

CASE 4.—Æt. 35 ; eighth confinement. The first six labours had been easy, the seventh lingering. The first stage of labour was protracted, lasting about sixty hours. When the os had become fully dilated the pains were frequent and weak, the head making scarcely any advance ; suddenly the patient uttered a loud scream and became pale ; her pulse could not be felt at the wrist. The pain ceased from this time, and no uterine action was produced by the administration of two doses of

ergot. The pulse became perceptible after a while, at first slow, afterwards quickening to about 110. Forceps were applied, and a dead male child extracted; a large quantity of blood followed. The uterus contracted well, but there was a separation of the anterior vaginal wall from the uterus, and the intestines could be felt through the opening. In this case the pelvis was capacious. The patient sank, and died about twenty hours after.

CASE 5.—Æt. 42; fifth confinement. Previous labours had been natural. Vigorous pains continued for five hours after the os had become fully dilated, and then suddenly ceased. The pulse rose from 95 to 140; the patient appeared somewhat anxious, complained of pain in the epigastric region, retched a little, but did not vomit. The head, which was of large size, had just entered the pelvic brim, which was itself ample. Forceps were applied, and a dead male child extracted. The hand being introduced to remove the placenta it was found that the uterus was ruptured on the left side. The rent was about five inches long, and extended from about the middle of the body almost to the os. The patient died about twenty-six hours after delivery.

CASE 6.—Æt. 33; seventh confinement. Former labours had been fairly easy. Pains were weak from the first, but some progress continued till the head had entered fully the cavity of the pelvis, six hours after the commencement of labour: they then almost entirely ceased, and the woman appeared somewhat exhausted. A dose of ergot was given, but was soon vomited, and the pains continued to be very weak. About two hours after the patient complained of feeling faint, respiration became gasping, and the pulse at the wrist almost imperceptible. Soon after she attempted to raise herself, and fell back dead. The child, a male, was quickly delivered by long forceps, but was dead. A copious stream of blood followed.

Post-mortem.—The uterus was distended by an immense quantity of clots, and a rent extended from near the insertion of the left round ligament into the vagina. There was much blood in the peritoneal cavity, and the placenta was almost detached. It appeared uncertain whether the hæmorrhage preceded or followed the rupture.

CASE 7.—Æt. 29; ninth confinement. Membranes ruptured four days before labour commenced, and liquor amnii gradually drained away. Assistance was sent for about fifteen hours after the commencement of pains. When the patient was first seen the pains, which had previously been strong, had entirely ceased for half an hour. The woman was rather pale, but appeared in fair condition; pulse 120. The left arm of the child was prolapsed in the vagina, the abdomen posterior. There was slight hæmorrhage from the vagina. Internal version was performed under chloroform without difficulty. A dose of ergot was given without producing any uterine action, and a dead male child was then extracted. The pulse had risen to 140. The hand being introduced to remove the placenta, it was found that the uterus was ruptured anteriorly, and a coil of intestine occupied its cavity. Symptoms of peritonitis followed, and the patient died four days after delivery.

Inversion of the Uterus.

In one case the uterus became spontaneously inverted two days after delivery, and the patient quickly died from hæmorrhage.

CASE.—Æt. 25; first confinement. Labour was normal, and the placenta was expelled naturally, without any traction being made upon the cord to remove it. The next day she was comfortable; lochia normal. On the morning of the third day, while she was passing water, a gush of blood took place, and she suddenly exclaimed that something was passing from her. She immediately became faint, and was found blanched and pulseless, copious hæmorrhage having taken place. The inverted uterus was external to the vulva. She expired almost immediately, and after death it was not found possible to restore the uterus.

Post-partum Hæmorrhage.

Post-partum hæmorrhage has, as usual, been of frequent occurrence among the mothers, a large portion of whom are ill-fed and enfeebled. It has been a serious source of mortality, having directly caused death in eleven cases.

Besides these, there was one instance of fatal syncope after only slight hæmorrhage, and three of flooding followed by death from exhaustion or septicæmia at a later period. In two of these the placenta had been adherent. In nine cases a solution of perchloride of iron was injected into the uterus, but this measure was never adopted until the effect had first been tried of introducing the hand into the uterus, clearing out clots, and compressing it between the internal hand and the other hand applied externally to the abdomen. In all instances the iron injection stopped the bleeding, but in two the patients sank from the effects of the hæmorrhage about an hour after, and one woman died from septicæmia on the twenty-sixth day. Besides the fifteen cases recorded under the present heading there were two fatal cases of placenta prævia and one of accidental hæmorrhage, in which post-partum hæmorrhage also occurred. In these three cases the injection was used when the patients were already in desperate condition, but did not avert the fatal result. In none of the twelve cases in which it was employed did the injection appear to have itself contributed to a fatal issue, but in three of the patients who recovered there were transient febrile symptoms on the second or third day after its use. In three instances the solution used had the strength of one part of the *Liquor Ferri Perchloridi Fortior* to two or three parts of water, but in all the others it was more dilute.

There is no successful instance of transfusion recorded. An Aveling's apparatus has only been provided for the last year, and thus there has generally been no instrument ready on the spot, and the operation has only been commenced when the patient was already moribund. Moreover, it has not generally been found possible to obtain a donor of blood, and it has been necessary to use a saline solution. The operation has been performed in five cases, including two of placenta prævia. In two a temporary benefit was observed after the injection of a saline solution. In one instance immediate transfusion was commenced with Aveling's apparatus, but it was interrupted by the formation of a clot in the syringe. In another case a portion of the blood lost by the patient was strained and transfused by means of Aveling's syringe. In this case also

a clot formed in the vein and extended into the tube of the syringe.

CASE 1.—Æt. 38; fifth confinement. The placenta was retained after natural labour, and post-partum hæmorrhage took place, which ended fatally.

CASE 2.—Æt. 33; a thin, sickly woman. She had had thirteen miscarriages previously. Labour was protracted, and the pulse was about 130 for some time before delivery. The child, a male, was stillborn. Its birth was followed by the expulsion of a large quantity of clots, and a stream of liquid blood. All efforts to produce contraction of the uterus were futile, and she died two hours after delivery.

CASE 3.—Post-partum hæmorrhage occurred in a woman who had suffered in a similar way in several previous labours. Transfusion was performed by Dr. Hicks, but the patient eventually died.

CASE 4.—Æt. 39; eighth confinement. Labour lasted about twenty-four hours. The birth of the child was immediately followed by a copious gush of blood, which was checked by pressure and cold. The expulsion of the placenta, four minutes after, was also followed by severe hæmorrhage to the extent of several pints. It was at length checked by the injection of cold water into the uterus. The woman became pulseless, and had convergent strabismus and convulsions, but rallied under stimulants, and eventually recovered well.

CASE 5.—Æt. 29; third confinement. Severe hæmorrhage took place before and after the expulsion of the placenta. The uterus could not be made to contract, and eventually three drachms of Liq. Ferri. Perchlor. Fort., with a pint of water, were injected into it. This stopped the bleeding, and the patient did well.

CASE 6.—Æt. 20; first confinement. Labour lasted about twelve hours, the head was arrested near the outlet for four hours, and the pulse reached 100. A living female child was delivered by short forceps. The placenta was expelled naturally, and was immediately followed by most severe hæmorrhage, which could only be controlled by the injection into the uterus of a dilute solution of perchloride of iron. The patient remained in a very exhausted state, and was attacked by a low

form of puerperal fever, from which she died on the twenty-fourth day.

CASE 7.—Æt. 18; first confinement. Severe post-partum hæmorrhage occurred, only controlled by the injection of perchloride of iron into the uterus. Patient did well.

CASE 8.—Æt. 36; sixth confinement. She had been very insufficiently fed throughout her pregnancy. The child, a male, presented by the breech, and was born alive without assistance. The placenta was universally and closely adherent, and was peeled off by the hand. On the seventh day profuse hæmorrhage took place, and she was found blanched and almost pulseless. A clot was removed from the uterus by the finger, and ergot given, after which the bleeding did not recur. She remained, however, very exhausted, and died on the fourteenth day after delivery. No autopsy was made.

CASE 9.—Æt. 41; ninth confinement. Flooding took place while the placenta was retained, and the patient died nineteen hours after.

CASE 10.—Æt. 31; sixth confinement. Post-partum hæmorrhage took place, and could not be controlled until perchloride of iron was injected into the uterus. Patient did well.

CASE 11.—Æt. 21; second confinement. Hæmorrhage could not be controlled by ergot, nor by the introduction of the hand into the uterus. One part of Liq. Ferri. Perchlor. Fort. and eight parts of water were then injected into the uterus, and at once stopped the bleeding. The next day the abdomen was tender; temperature 104.2° ; pulse 150. From the third day, however, temperature and pulse became normal, and the patient recovered rapidly.

CASE 12.—Æt. 23; third confinement. The child was born before the arrival of assistance, and the patient was found bleeding profusely. Hæmorrhage continued for two hours, and no contraction of the uterus could be procured even by compression between one hand introduced into its cavity and the other applied to the abdomen. Cold water was injected into it, but only had the effect of distending it, and had to be expelled by external pressure. The woman had now become pulseless and delirious. Four ounces of Liq. Ferri. Perchlor. Fort., with eight ounces of water, were then injected, and

produced firm contraction of the uterus, and complete cessation of hæmorrhage. Temperature rose as high as 104° on the second day, but in a week she was convalescent. For some days the uterus was washed out with dilute solution of permanganate of potash.

CASE 13.—Æt. 32; sixth confinement. The patient died from post-partum hæmorrhage before the arrival of assistance.

CASE 14.—Æt. 36; seventh confinement; a very ill-fed anæmic woman. The child was born asphyxiated, and required artificial respiration for half an hour. The placenta was then found in the vagina. Some bleeding took place at its removal, and went on afterwards, not at all profusely, but continuously. No firm contraction of the uterus could be obtained by cold, or by the introduction of the hand within it, and the patient became restless and delirious. One part of Liq. Ferri Perchlor., with three parts of water, was then injected to the extent of two or three ounces. No more bleeding occurred; the pulse somewhat improved, and a fatal result was scarcely expected, but the patient became rather suddenly faint, and died about an hour after the injection.

CASE 15.—Æt. 30; seventh confinement. The child was born asphyxiated, and internal hæmorrhage took place while attempts were being made to resuscitate it. When attention was directed to the mother, she was found almost dead, and expired immediately. The placenta was in the vagina.

CASE 16.—Æt. 35; fourth confinement. After a lingering labour she was delivered of twins. The second presented by the breech and was stillborn. While attempts were made to restore it internal hæmorrhage took place, the woman became blanched, and the pulse rose to 140, scarcely perceptible. Clots were removed and a single placenta was found to be adherent to the fundus. It was easily separated, but neither manipulation, ergot, nor the injection of cold water produced any contraction of the uterus. One part of Liq. Ferri Perchlor., with three parts of water, was then injected, and was immediately successful. The patient was delirious on the second day, but recovered well. Temperature did not rise above 100.5° .

CASE 17.—Æt. 34; third confinement. The extern improperly left the case while the placenta was retained, and the

patient died probably from internal hæmorrhage. No autopsy was permitted.

CASE 18.—Æt. 38; ninth confinement. Hæmorrhage occurred two hours after delivery, and the uterus was found full of clots, the patient cold and collapsed, entirely pulseless. No contraction of the uterus could be obtained until some perchloride of iron was injected. No suitable transfusion apparatus was at hand, and before one could be procured the patient died, within an hour after the injection of perchloride of iron.

CASE 19.—Æt. 28; second confinement. The placenta was retained, and some hæmorrhage took place before its removal, which required the introduction of the hand into the uterus. Pulse afterwards was somewhat over 100. The patient did well till the sixth day, when the pulse rose to 120; temperature 101° ; milk diminished; lochia normal; no abdominal tenderness. The next morning she was better; pulse 112; temperature 100° ; but she died unexpectedly in the afternoon. No autopsy was allowed, and the cause of death remained uncertain.

CASE 20.—Æt. 22; third confinement. Hæmorrhage took place before the removal of the placenta, and the pulse rose to 130. The amount lost seemed to be not more than two pints. The uterus was found contracted round an adherent placenta. Ergot was given, and the placenta removed by the hand, after which no more bleeding occurred. The patient remained blanched, and the pulse became gradually worse. As no donor of blood could be found, about six ounces of that lost by the patient, which had been received in a clean utensil, were collected. This blood was strained through muslin, a little phosphate of soda added, and transfusion was then commenced with an Aveling's syringe. A clot, however, was soon formed in the vein, and extended into the tube of the syringe. The patient sank, and died about half an hour later.

CASE 21.—Æt. 34; ninth confinement. Had suffered from dyspnœa and palpitation before delivery. Slight post-partum hæmorrhage took place, but was checked by ergot and the injection of cold water into the uterus. Brandy was afterwards administered. At the next visit, three hours after, the patient was found dead. The husband and friends, who were in the room, supposed her to be only sleeping.

Post-mortem.—Extensive fatty degeneration of the heart was found.

CASE 22.—Æt. 25; fourth confinement. The placenta was retained and severe flooding took place. On removal by the hand, it was found partially adherent. No more bleeding took place, but the patient was blanched, restless, and delirious, and the pulse became gradually worse. Immediate transfusion was commenced with Aveling's apparatus, but was soon interrupted by the formation of a clot in the syringe. The husband was the donor of blood. A saline solution of sp. gr. 1030 was then quickly prepared, but the patient was already moribund, and died while it was being injected.

Placenta Prævia.

Forty-one cases occurred, or 0·17 per cent. In 6 of the cases the partially dilated os, when the patient was first seen, was found completely covered by placenta; in 25 it was incompletely covered; in the remaining 10 it is not stated how far the placenta was spread over the os. No certain conclusion can, of course, be drawn from this as to the exact relative position of the placenta before dilatation of the internal os commenced.

In some instances, in which only a small portion of the os was covered by placenta, and the hæmorrhage was not excessive, the treatment adopted was that of rupturing the membranes and administering ergot. But in most cases, in which any considerable bleeding had occurred, the old-fashioned mode of treatment has still been followed, namely, to perform version as soon as the os is sufficiently dilated to allow this to be done without the use of force. It was in almost all cases effected by the bipolar method, without the introduction of the hand into the uterus. If the os was undilatable when the patient was first seen the plan adopted was to plug the vagina, or recently, by preference, to plug the cervix with a dilating bag. Advantage has also been found from the expedient of separating the placenta by the finger from the cervical zone of the uterus.

One remarkable case occurred (Case 8) in which the placenta was found to occupy three fourths of the area of the

fully dilated os, but no hæmorrhage whatever had taken place. In this instance the conjugate diameter of the pelvis was contracted, and a living child was delivered by version. There was another instance also (Case 30), in which a portion of the placenta presented, and no hæmorrhage had occurred. The funis was prolapsed, and delivery was effected by forceps, but the child was not saved.

Version was performed in 24 out of the 41 cases. Six of the mothers died, 4 from the direct effect of hæmorrhage, 2 at a later stage from exhaustion or septicæmia. In 2 of the fatal cases the whole placenta had been separated and expelled spontaneously before the birth of the child, and death took place from hæmorrhage: in 3 version had been performed: in 1 case the treatment is not stated. Of the children, 10 were living; 31 were stillborn.

CASE 1.—Æt. 32; second confinement. The child, a male, appeared to have been dead some days. Mother died. Details wanting.

CASE 2.—Æt. 33; fifth confinement. Hæmorrhage first occurred thirty-three days previously, and was profuse. Repeated slight attacks had occurred ever since. She was found very anæmic, the os almost fully dilated, partially covered by placenta, membranes entire. Internal version was performed, and the child, a male, was stillborn. Mother recovered well.

CASE 3.—Æt. 37; tenth confinement. Version performed. Dead male child. Mother did well.

CASE 4.—Æt. 36; fourth confinement. Version performed. Dead male child. Mother died on third day.

CASE 5.—Æt. 38; eleventh confinement. Slight hæmorrhage commenced several days before, and was said to have amounted to several pints in all. The os was found about two and a half inches in diameter; the placenta attached to its posterior lip; pulse good. The membranes were ruptured, and one drachm of *Pulvis Ergotæ* was administered. Within an hour the head descended and stopped the hæmorrhage. The child, a male, was stillborn. Mother did well.

CASE 6.—Æt. 40; eleventh confinement. The liquor amnii was very profuse, and a foot presented, with partial placenta prævia. Living male child. Mother did well.

CASE 7.—Æt. 30; fifth confinement. Os covered partially by placenta. Treated by rupture of membranes. Dead male child. Mother recovered.

CASE 8.—Æt. 32; third confinement. The os had been fully dilated two hours, and the placenta could be felt occupying three fourths of its area at the posterior part, but there had been no hæmorrhage. Membranes entire. The diagonal conjugate diameter of the pelvis was only three and a half inches, and the head was resting high above the pubes. After a fruitless attempt to turn by the bipolar method the membranes were ruptured, and internal version performed. The child, a male, was living. Mother did well.

CASE 9.—Æt. 26. Had been losing blood for a month, and a week before hæmorrhage was severe, but ceased without any treatment. The os was found dilated sufficiently to admit two fingers, and the placenta covered three fourths of its area. A large quantity of clots had been passed. Bipolar version was performed, and a stillborn child delivered. There was slight post-partum hæmorrhage, and some symptoms of peritonitis occurred afterwards, but the patient soon recovered.

CASE 10.—Æt. 42; fifth confinement. Version performed. Dead male child. Mother recovered.

CASE 11.—Æt. 24; fourth confinement; in the eighth month of pregnancy. Had been married at seventeen. Flooding commenced suddenly a week previously, and continued to recur at short intervals. The os was found dilated enough to admit two fingers, and was partially covered by the placenta. The membranes were ruptured, and the labour terminated naturally. Living male child. Mother recovered rapidly.

CASE 12.—Æt. 24; third confinement. The patient's friends refused to allow the administration of chloroform for the performance of version, and ten hours afterwards the child, a dead male, was expelled spontaneously. Mother recovered. Details not reported.

CASE 13.—Æt. 26; sixth confinement. The os was found more than half dilated, the placenta partially covering it, and about one third of it detached. The membranes were first ruptured, and, as the hæmorrhage still continued, version was performed. Dead male child. Mother had metritis, but eventually did well.

CASE 14.—Æt. 34; fifth confinement. When first seen she had been suffering from severe hæmorrhage for a fortnight. The os was the size of half-a-crown, placenta covering its posterior half. The patient was very anæmic; pulse 98. She refused to allow any interference until considerable hæmorrhage again recurred, as it did after eighteen hours. The os was then nearly fully dilated, placenta covering the whole. Bipolar version was performed under chloroform; two doses of ergot were afterwards given, and the child, a male, was born alive. The mother made a very slow recovery, and had slight phlegmasia dolens in both legs.

CASE 15.—Æt. 25; third confinement. Treated by rupture of membranes. Labour completed naturally. Living male child.

CASE 16.—Æt. 34; tenth confinement. Hæmorrhage commenced ten weeks previously. Version performed. Dead female child. Mother recovered.

CASE 17.—Æt. 39; eighth confinement. Version performed. Living male child. Mother recovered.

CASE 18.—Æt. 19; second confinement; in eighth month of pregnancy. She had had occasional hæmorrhage since the fourth month, and for three days more profuse loss, accompanied by slight labour pains. The os was found dilated enough to admit three fingers, the placenta stretching half across it. Bipolar version was performed under chloroform, and a dose of ergot afterwards given. The child, a female, was dead. Mother did well.

CASE 19.—Æt. 26; sixth confinement. Repeated hæmorrhage had occurred for seven weeks. When first seen the os would only admit one finger. The vagina was plugged repeatedly for three days, the tendency to flooding being very strong. The os was then dilated enough to admit three fingers, the placenta stretching half across it. Bipolar version was performed under chloroform, and ergot given. The child, a male, was dead. Mother recovered.

CASE 20.—Æt. 27; fourth confinement. Version performed. Dead female child. Mother recovered.

CASE 21.—Æt. 23; second confinement. No hæmorrhage occurred until the commencement of labour pains, when it came on very profusely. The patient did not send for assist-

ance till five hours after. She was then found exsanguine, and almost pulseless. The vagina was plugged with a wet handkerchief for an hour. She had then rallied somewhat, but a gush of blood followed the removal of the plug. The edge of the placenta was felt posteriorly. The hand being introduced with the intention of turning, the whole placenta was separated and expelled by a sudden pain. Version was, however, completed. The patient was then moribund, and when the transfusion apparatus had been fetched, the pulse and respiration were just ceasing. Four ounces of blood were, however, procured from her mother, and transfused, but without effect, for she was probably already dead. The child, a male, was undelivered at the time of death. The cavity of the uterus was full of clots.

CASE 22.—Æt. 33; fifth confinement. Slight loss of blood had occurred for a fortnight previously, and became profuse on the commencement of labour pains. The os was found dilated enough to admit three fingers, and was covered entirely by placenta, except a small margin posteriorly. The placenta was detached by the finger from the cervical zone, and the os dilated with the largest-sized Barnes' bag. Bipolar version was then performed without chloroform, and after three hours ergot was given. The cord was pulsating when the body of the child was expelled, but its life was lost owing to difficulty in extricating the arms. The mother had febrile symptoms for some time, but recovered.

CASE 23.—Æt. 34; ninth confinement. At the commencement of labour pains a sudden loss of about two pints of blood took place. A small tongue of placenta was found dipping through the os, and a heel presenting. Ergot was given and a living male child extracted. Mother did well.

CASE 24.—Æt. 38; ninth confinement, in eighth month of pregnancy. Flooding first occurred two weeks before. The os was found undilated and nothing to be felt; no labour pains. Next day the os was the size of a sixpence, the placenta to be felt within it. No considerable recurrence of hæmorrhage took place till labour pains commenced, two days later, but it then came on profusely. The os was the size of half-a-crown, the placenta protruding from the front part of its circle. The cervix was plugged for a time, and bipolar version then performed under chloroform. Ergot was afterwards given, and a

dead female child extracted. The mother suffered from a low form of bronchitis, and made a very tardy recovery.

CASE 25.—Æt. 30; fifth confinement. When first seen she had been losing blood for a week. She was found much exhausted and blanched, the os completely covered by placenta. Internal version was performed, and a dead female child extracted. The pulse was then hardly perceptible, the uterus did not contract, and hæmorrhage continued. This was stopped by the injection of perchloride of iron. An hour and a half later transfusion was performed with eight ounces of saline fluid of specific gravity 1080. The fluid consisted of salt and water, with ten grains of carbonate of ammonia. The patient rallied for a time and spoke rationally, but gradually sank, and died about four and a half hours after.

CASE 26.—Æt. 33; fifth confinement; pregnant eight and a half months. Hæmorrhage had continued three days, commencing with the onset of labour pains. The os was found about the size of a crown piece. Posteriorly a piece of placenta was felt, and in front the child's left shoulder. The placenta was detached by the finger from the cervical zone, and internal version afterwards performed. The child, a male, was living. Mother did well.

CASE 27.—Æt. 40; tenth confinement. Sudden and profuse hæmorrhage came on a little before the full term of pregnancy. The os was partially covered by placenta, and was dilated enough to admit two fingers. The membranes were ruptured, and the os further dilated by the fingers. The head rapidly descended, and pushed aside the placenta, and a living male child was born within two hours from the time when the patient was first seen.

CASE 28.—Æt. 24; fifth confinement. Patient had been losing blood for three weeks. The os was found dilated to about the size of a florin, completely covered by placenta. The placenta was separated by the finger from the cervical zone, and bipolar version performed. A dead male child was extracted. The placenta was partially adherent, and required separation by the hand. Mother did well.

CASE 29.—Æt. 22; first confinement; pregnant about seven months. The first hæmorrhage occurred two weeks before, and for three days it had been profuse. The patient was found

blanched, the os dilated to the size of a crown piece and completely covered by placenta. Bipolar version was performed and ergot administered. The child, a female, was dead. The mother had some febrile symptoms, and the temperature rose to 104°, but in a week she was convalescent.

CASE 30.—Æt. 30; fifth confinement. No hæmorrhage had occurred, but part of the placenta was found presenting between the foetal head and the sacrum, and the funis was prolapsed. Delivery was effected by forceps, but the child, a female, was dead. Mother did well.

CASE 31.—Æt. 38; ninth confinement. Hæmorrhage commenced with onset of labour. Almost half the os was occupied by placenta. Bipolar version was performed, and ergot administered. Dead female child. Mother did well.

CASE 32.—Æt. 34; third confinement. No hæmorrhage occurred, but about one fourth of the placenta was found between the child's head and the sacrum, and the funis prolapsed. A dead male child was soon expelled naturally. Mother did well.

CASE 33.—Æt. 22; first confinement; pregnant six months. The placenta, arm, and head presented. A dead male child was expelled spontaneously.

CASE 34.—Æt. 20; second confinement; pregnant not quite eight months. Severe hæmorrhage commenced with the onset of labour pains twelve hours before. The os was found dilated enough to admit three fingers, covered in great part by placenta. Bipolar version was performed without chloroform and a dead female child extracted. The mother made a very slow recovery, as she was suffering from confirmed phthisis.

CASE 35.—Æt. 27; third confinement; pregnant seven months. The placenta completely covered the os uteri. Version was performed and a living male child delivered. Mother died four days after from septicæmia.

CASE 36.—Æt. 29; fourth confinement. Hæmorrhage commenced a little before full time, and had continued eight days. The os was dilated to the size of half-a-crown, and completely covered by placenta. The placenta was partially separated by the finger, and internal version performed. The child, a male, was dead. Mother did well.

CASE 37.—Æt. 35; eighth confinement. Partial placenta

prævia. Membranes were ruptured and ergot given. Dead female child.

CASE 38.—Æt. 34; seventh confinement. Os found about the size of a florin, and three fourths covered by placenta. Bipolar version performed. Dead female child. Mother did well.

CASE 39.—Æt. 44; twenty-third confinement. Slight hæmorrhage occurred at the onset of labour, and a hand and foot with a portion of funis presented. The placenta could not be felt at first, but a portion of it was afterwards driven down from the posterior lip of the os, and increased hæmorrhage took place. A dead male child was extracted by traction. Mother recovered quickly.

CASE 40.—Version performed. Mother did well. Details wanting.

CASE 41.—Æt. 19; primipara; pregnant about seven months. Hæmorrhage having taken place, accompanied by slight pains, the os was found to be completely closed. It continued in this state for three days, and the loss of blood was very slight. At the end of that time labour pains came on. No assistance was sent for until six hours later, and the placenta was then found to have been completely expelled, the child presenting by the left foot. The hæmorrhage did not seem to have been great, and no more of consequence took place. After delivery the pulse was 140. A dose of ergot was given and brandy at short intervals. The pulse then fell to 105, the uterus contracted well, and at the end of an hour the patient was left sleeping quietly. After another hour assistance was again sought, and she was found faint and pulseless. There had been no external bleeding, but a slight gush took place on manipulating the uterus. As the patient appeared moribund a weak solution of perchloride of iron was at once injected, and a saline solution quickly prepared for transfusion. She died, however, just as the first syringe full was being injected.

Accidental Hæmorrhage.

There are 31 cases reported in which hæmorrhage, independent of placental presentation, occurred before delivery;

the most important of these are recorded below. Five of the mothers died, all from the direct effect of the loss of blood. In 1 of these the hæmorrhage was chiefly internal and concealed. Delivery was effected by version in 3 cases; in the remainder of those which required interference the treatment adopted was that of rupturing the membranes, and, if necessary, administering ergot. Of 22 of the cases, in which the hæmorrhage was at all important in extent, the children were living in 8 and stillborn in 16. In the 10 most serious cases, of which details are given below, 8 of the children were still-born.

CASE 1.—Æt. 32; ninth confinement. Five hours after commencement of labour pains the patient turned faint and pale, and soon a gush of blood took place, estimated at at least three pints. A succession of fainting fits followed, and some oozing continued. The os was found dilated to the size of a crown piece; the membranes were ruptured, and brandy administered. A dead female child was expelled an hour and a half later. The placenta contained more than a pound of solid fibrinated clot attached at various parts to its structure, the intervening parts being hollowed out by pressure. The mother's recovery appeared doubtful for several days, but ultimately she did well.

CASE 2.—Æt. 36; tenth confinement. Severe ante-partum hæmorrhage occurred, producing syncope. A living male child was expelled naturally, but the mother died three hours after delivery.

CASE 3.—Æt. 26; seventh confinement. When first seen she had been flooding for an hour and a half. The os was fairly dilated, and blood gushed out at each pain; no placenta to be felt. The membranes were ruptured, and a dead male child was quickly expelled. Ergot and brandy were afterwards administered, but she sank and died five hours after delivery.

CASE 4.—Æt. 37; sixth confinement; pregnant seven months. Severe ante-partum flooding took place, and she was found fainting and pulseless, the os about the size of a crown piece. She was revived somewhat by brandy, and then version was performed under chloroform, and a dead female child delivered. Mother made a good recovery.

CASE 5.—Æt. 38; sixth confinement; pregnant about eight months. Considerable hæmorrhage came on without any labour pains or dilatation of the os. Labour was induced by the introduction of an elastic catheter into the uterus, the membranes being also ruptured. A living male child was delivered twenty hours after. Mother did well.

CASE 6.—Æt. 34; ninth confinement; pregnant about eight months. Two days after receiving a blow she felt faint and sick on getting up, with some abdominal pain, and there was slight hæmorrhage from the vagina. The os was very slightly dilated, external hæmorrhage very little. The membranes were ruptured, and, within an hour, a dead and stiff female fœtus was expelled. It was followed by the placenta and by a very large quantity of clotted blood. Some fresh hæmorrhage also continued. The body of the uterus having contracted well, while the cervix was flaccid, some solution of perchloride of iron was applied to the cervix, after which bleeding entirely ceased. The patient, however, was blanched and drowsy, pulse 120, very small, and her extremities became cold. She rallied somewhat for a time, so that it was thought that transfusion would be unnecessary, but died about six hours after delivery.

Post-mortem.—The uterus was normal, and no sign of violence was found.

CASE 7.—Æt. 24; second confinement. She had fallen and struck herself thirteen days before, and had suffered pain in the abdomen since. Hæmorrhage commenced with slight labour pains. The os was found to admit two fingers, the vertex was presenting. A slight gush of blood took place with each pain. Not much blood was lost, but when the os had become dilated to the size of a crown piece the pulse had risen to over 120. The membranes were then ruptured, and with the gush of fluid the funis and one hand became prolapsed, and could not be returned. Version was therefore performed, and a female child extracted. It made one or two attempts to breathe, but could not be resuscitated. Some bleeding took place after delivery; the uterus was relaxed, and the placenta adherent. It was removed piecemeal with some difficulty. Mother eventually did well.

CASE 8.—Æt. 29; fifth confinement. Sudden and alarming ante-partum hæmorrhage having taken place, the os was found

about the size of half-a-crown; no pains; pulse 140, very feeble. The membranes were ruptured, and ergot administered, but no uterine action took place, and the pulse rose to 160. The os being no further dilated, bipolar version was performed, and a dead female child was soon extracted. The uterus remained flaccid, and slight hæmorrhage again occurred. A dilute solution of perchloride of iron was at once injected, and stopped the bleeding. The mother was blanched and extremely restless, and died while the transfusion apparatus was being fetched, about an hour after delivery.

CASE 9.—Æt. 33; second confinement. At commencement of eighth month of pregnancy she was greatly excited by a quarrel, after which she felt abdominal pain and became faint. No foetal movements were felt after this time. Eight days later considerable hæmorrhage took place, and continued slightly for four days more, after which labour pains commenced, with increase of hæmorrhage. The funis presented, pulseless, with the vertex, and a decomposed foetus was delivered naturally. The placenta was removed with difficulty, and she lost about twenty ounces more blood. After this she was delirious, pulse 120, but she steadily improved till the ninth day, when profuse bleeding again took place. This was checked by ergot and gallic acid, and eventually she did well.

CASE 10.—Æt. 27; second confinement. When first seen considerable ante-partum hæmorrhage had taken place, and she was much blanched. No more bleeding occurred, and labour was completed naturally. The child, a male, was stillborn. The uterus then contracted, and she seemed in fair condition. Two hours after, when the nurse was changing her clothes, she fell back suddenly and died.

Post-mortem.—The uterus was normal. The heart showed some fatty degeneration, and its walls were thin.

Adherent Placenta.

The placenta was adherent, and required the introduction of the hand into the uterus for its removal in 75 cases, or 1 in 315; or .32 per cent. In 7 cases there was also hour-glass contraction of the uterus. In 32 of the cases hæmorrhage occurred to

an important extent before the removal of the placenta, and led to a fatal result in 3 cases (*vide* Post-partum hæmorrhage, Cases 8, 20, and 22). In one instance ante-partum hæmorrhage had taken place (*vide* Accidental hæmorrhage, Case 7). In one case of twins the placentæ were separate and were both adherent. In 8 cases severe symptoms of puerperal peritonitis followed, and two of them ended fatally. In one of these there was no hæmorrhage, and the patient and her friends refused to allow any interference for the removal of the placenta. One patient was lost sight of after the forty-eighth day, when she still continued seriously ill (Case 4). In all the cases the febrile symptoms were associated at their outset with a foetid condition of the lochia, which was treated by antiseptic intra-uterine injections. One case, which commenced with the usual symptoms of puerperal peritonitis, became developed into distinct articular pyæmia, which eventually ended in recovery (Case 6). The whole number of deaths which occurred after adhesion of the placenta is five. A few of the most important cases are recorded below.

CASE 1.—Æt. 23; fourth confinement. Placenta had been completely adherent at the last labour. On this occasion both placenta and membranes were adherent throughout. No hæmorrhage whatever took place. The patient was removed to the hospital, and matters left, for the time, to nature. At the end of twenty-four hours decomposition had begun, and gradual but continuous bleeding took place. Chloroform was administered, and as there was no free edge to the placenta, the fingers were passed through its substance, and it was brought away piecemeal. Intra-uterine injections were afterwards used. The patient had some febrile symptoms, but recovered well.

CASE 2.—Æt. 27; second confinement. Placenta adherent at first labour. On this occasion also there was complete adhesion, and it was peeled off by the fingers. On the second day lochia were normal, but in the evening she had rigors and abdominal pain, and the discharge began to be foetid. On the third day she had vomiting; pulse 98. She improved somewhat until the sixth day, when the pulse rose to 180, with increased abdominal pain. She died on the eleventh day.

Treatment.—Opium and salines, with intra-uterine injections.

CASE 3.—Æt. 32; seventh confinement. After normal labour the placenta did not come away for three hours, but no hæmorrhage took place. It was found to be adherent over the greater part of its surface, and the internal os uteri was tightly contracted. The placenta was peeled off with much difficulty, and a good deal of bleeding took place during the process. The patient was afterwards collapsed and her pulse imperceptible, but she rallied in a short time. On the third day the pulse was 140, temperature 104° . Intra-uterine injections were then used, and she rapidly recovered.

CASE 4.—Æt. 19; first confinement. Some post-partum hæmorrhage took place, and the placenta was found extensively adherent. It was necessary to remove it piecemeal. Intra-uterine injections were used on the second day, and continued for several days. On the fourth day she had some abdominal pain, and on the fifth the temperature rose to 105° , milk continued abundant. She then improved for several days, but on the eighth day the temperature was 105° , and on the ninth 106.4° ; pulse 140. The temperature continued over 104° up to the thirteenth day. From the eleventh day she had diarrhœa and delirium. By the twenty-eighth day she was somewhat improved, but refused to come into the hospital as recommended. On the forty-eighth day she was again seen, and was in much the same state. *Treatment.*—Quinine in full doses.

CASE 5.—Æt. 30; sixth confinement. The placenta was adherent, and the patient refused to allow it to be removed. She died a week after from puerperal peritonitis.

CASE 6.—Æt. 28; first confinement. The position of the head was occipito-posterior, and it was delayed for some time on the perinæum. The placenta was adherent, and had to be separated by the hand. Febrile symptoms appeared on the third day; the lochia were scanty and foetid, the patient became delirious, and there was profuse diarrhœa. Suppuration afterwards took place about several joints. The patient was removed to the hospital, and ultimately recovered, after a very protracted illness. *Treatment.*—Sulpho-carbolate of soda, and afterwards quinine in large doses.

Obliteration or Minute Contraction of the Os Uteri.

Two cases are recorded, one of apparently complete obliteration and the other of minute contraction of the os uteri, both occurring in primiparæ. In the second case the life of the child seemed to have been sacrificed on account of the long continuance of labour pains of the first stage, without any dilatation of the os, although it was alive a few hours before delivery.

CASE 1.—Æt. 35; first confinement, after eleven years' marriage. When first seen labour pains had lasted twenty-four hours. No os uteri could be detected by the finger, and when a speculum was used it was found to be closed by adhesions. These were broken down by the finger, producing some little laceration, and the os then dilated rapidly. Long forceps were afterwards applied, and a living female child delivered. Mother did well.

CASE 2.—Æt. 21; first confinement. When first seen she was said to have been in labour for six days. The head, covered by the uterine wall, was very low down in the pelvis, but the os uteri could only be detected as a minute depression. The foetal heart was heard; rate 116. With some difficulty a silver catheter was introduced into the os, then the little finger, and digital dilatation was continued until three fingers were admitted. The case was then left to nature, and a dead female child was delivered about six hours later. Mother did well.

Induction of Premature Labour.

Only two cases are recorded of induction of premature labour, since, of late, patients have almost invariably been admitted into the hospital, when it has been considered advisable to adopt such a measure.

CASE 1.—Æt. 30; sixth confinement. Premature labour had been induced on several previous occasions on account of obstruction of the pelvis by a tumour growing from the sacrum. When she was seven and a half months pregnant an elastic catheter was introduced between the membranes and the

uterus. Labour pains came on after about thirty-six hours. The child presented by the breech, and great force was required to bring the head past the tumour. It made some attempts to breathe, but could not be restored.

CASE 2.—Æt. 29; fourth confinement. Premature labour was induced at the eighth month, on account of pelvic contraction, by the introduction of an elastic catheter. The child, a male, was stillborn.

Eclampsia.

Twenty-eight cases of this complication are recorded, or 0·12 per cent., or 1 in 842. This does not, however, include all the slight cases which occurred.

Of twenty-seven cases, in which the manner of commencement of the attack is recorded, the first convulsion occurred before the onset of labour in two cases, both of which were fatal; during labour in sixteen cases, four of which were fatal; and after delivery in nine cases, one of which was fatal. Of the last, four occurred to the same individual in successive pregnancies (Case 1). Of the eighteen cases in which convulsions commenced before or during labour, the children were living in nine and stillborn in nine. There were seven deaths in all among the mothers.

In all the cases in which the urine was examined albumen was found except in one instance (Case 18). In this, internal hæmorrhage occurred after delivery, and epileptiform convulsions followed, the pulse being dicrotic and compressible, very unlike that generally found in eclampsia. In a second case, that of a confirmed epileptic (Case 21), the urine contained a cloud only of albumen, and after death the kidneys were found to be hard and deeply congested. In a third case (Case 11), in which the patient had also suffered from epilepsy, the urine tested soon after the commencement of the convulsions was free from albumen, but next day it contained a little, and the quantity of albumen continued to increase while the patient remained under observation. In a fourth case (Case 19), in which eclampsia came on three days after post-partum hæmorrhage, the urine passed before the convulsions contained no albumen, but another sample drawn off afterwards was albuminous. In this patient some œdema of the face and legs had been noted before delivery.

In all the other cases the quantity of albumen was very considerable, and in most of them casts also were numerous. In two cases it is noted that the albumen had entirely disappeared at the end of two or three days, and in two others it was reduced to a trace after a similar interval. The form of kidney affection associated with eclampsia was therefore not a chronic disease, but an acute and often a transient tubal nephritis. Since it has been recently urged by some that the importance of albuminuria in connection with eclampsia has been overrated, and that uræmia is only one of several common causes which may produce such a result, it may be of interest to note that, of all cases during the last forty years in which the urine was examined, it remained free from albumen in only two. One of these was that alluded to above, which followed internal hæmorrhage; in the other the convulsions were produced by arachnitis, as verified by an autopsy. The total number of cases in which the presence of albuminuria is recorded is forty-one, and there were several others in which œdema existed, but no specimen of urine was obtained. There is therefore considerable evidence to show that, whether the albuminuria is always the result of a common cause, or whether, in some instances, it may be the effect of the convulsions, it is at any rate associated with eclampsia in the great majority of cases.

In the earlier part of the twelve years venesection was resorted to in the most severe cases, but since October, 1868, no patient has been bled, and reliance has been placed on the administration of chloroform, often for many hours consecutively. It has not even been considered a contra-indication to this treatment if the element of coma has preponderated over that of convulsion, and there has been stertor and deep lividity of face. An instance of the successful use of chloroform under such circumstances is recorded in Case 17. A dose of croton oil has also generally been given at the outset. Out of 50 cases recorded before the change in the mode of treatment, there were 15 deaths, or 30 per cent. Out of 23 cases recorded since, there were 5 deaths, or 21·7 per cent. This latter percentage does not, however, give a fair representation of the results of the chloroform treatment, for in two of the fatal cases (Cases 23 and 24) there was no opportunity for the continuous use of chloroform. In a third (Case 21), the patient, an old epileptic,

was not seen till she had been comatose for three days, and in a fourth (Case 22), the fatal issue is perhaps to be attributed to a too long delay in effecting artificial delivery.

In reference to the treatment by bleeding it may be noted, that in two cases (Cases 18 and 19), the convulsions came on after considerable post-partum hæmorrhage, and that in a third (Case 23) hæmorrhage occurred after the convulsions, and the patient shortly after died unexpectedly from apnœa, the heart's action continuing long after respiration had ceased.

Delivery was effected by forceps in four cases, in all the rest by the natural efforts. Of the 25 patients 15 were primiparæ, or 60 per cent. In several patients who recovered a moderate elevation of temperature was noted, but in only one fatal case was any observation made as to the presence or absence of that hyperpyrexia which is described by Bourneville as generally occurring before death. In this instance the temperature rose to 108·8°. Cold affusion was employed, but too late to be of any avail.

CASE 1.—A. H—, æt. 18; second confinement. Had convulsions after labour, but no treatment appeared to be called for. Recovered well. The same patient appears in the records on no less than three subsequent occasions. Each time convulsions of no great severity occurred at a considerable interval after delivery. No special treatment was required, and the state of the urine was not recorded on any occasion. At her third confinement, a year and nine months after the second, she had convulsions thirty-six hours after delivery. After an interval of thirteen months she was confined a fourth time. Convulsions commenced thirty-three hours after delivery, and she had five fits at intervals of three or four hours. The fifth confinement followed after another interval of a year and eleven months, and she again had convulsions after labour. All the children were living.

CASE 2.—R. L—, æt. 17; primipara. Convulsions commenced when she had been in labour about six hours, and the head had nearly reached the outlet of the pelvis. The child, a male, was expelled naturally in about an hour, and the placenta a few minutes later. She was then insensible, violent convulsions coming on every few minutes; pupils dilated; foaming at the mouth; tongue bitten. The treatment consisted of croton

oil, with injections of assafoetida; mustard plasters to the feet, and ice to the head. Seven hours later she was bled to the extent of ten ounces, but no relief was obtained. She died twenty hours after the commencement of the convulsions, having been perfectly insensible since the birth of the child.

CASE 3.—E. L—, æt. 18; primipara, a strong, healthy looking young woman; being near the full time of pregnancy, was seized with strong convulsions, and quickly became insensible. Bleeding to the extent of ten ounces, and the administration of a drop of croton oil, produced no beneficial effect. The membranes were ruptured, and the child, a dead female, was subsequently delivered by forceps. Insensibility and convulsions continued, and she died thirty-six hours after delivery. Urine loaded with albumen.

CASE 4.—E. W—, æt. 18; primipara, a short, stout young woman; had an epileptiform convulsion just as the os was becoming fully dilated, and subsequently remained insensible. She had complained of headache for a day or two previously. A second convulsion followed in a few minutes, and a third within forty minutes from the first. The urine was found to be albuminous and the legs highly cedematous. Two half-drachm doses of ergot were given with scarcely any effect upon the pains. The head appeared to be impacted close to the perinæum. Short forceps were then applied, and the child, a female of large size, delivered. It was semi-asphyxiated, but revived. An hour afterwards the mother became sensible, and rapidly progressed to recovery.

CASE 5.—E. H—, æt. 20; primipara; had been subject to epileptic fits all her life. During the last two hours of labour she had several fits, and remained unconscious until half an hour after delivery. She recovered well. State of urine not recorded. Female living child.

CASE 6.—M. N—, æt. 24; sixth confinement. The first stage of labour was long protracted, the liquor amnii having escaped early. The os was about the size of a florin, rigid and undilatable. Several doses of opium were given at short intervals, and chloroform was afterwards administered. When this had been continued about half an hour she had a violent convulsion, followed by coma. The os was now dilating rapidly and the administration of chloroform was discontinued. She

had no more fits, and the child, a living male, was expelled naturally in about five hours. There was no œdema, and no specimen of urine could be obtained.

CASE 7.—E. B—, æt. 21; primipara; had scarlatina and dropsy when nine years old, but had been quite well since. For three weeks before her labour she had œdema of the legs. The duration of labour was twelve and a half hours, and shortly before its conclusion a dose of ergot was given, as the pains had become feeble. Six hours after delivery she had an epileptiform fit, which was succeeded by others, and at the end of five hours from the first fit she had become almost completely comatose. The breathing was stertorous for a time after each convulsion. The administration of chloroform was then commenced, and she was kept fully under its influence for five hours, during which time the fits recurred every few minutes, many of them being very violent. After this they became less frequent, but the chloroform was continued in less degree for four hours more, being only pushed to complete anæsthesia when the breathing began to be stertorous. A dose of two minims of croton oil and three grains of calomel had been given when the chloroform was first administered, and in about three hours it produced a free evacuation from the bowels. Chloroform was discontinued after an administration of nine hours, and, after sleeping four hours more, she became sensible and quite quiet. The fits did not recur. The urine, drawn off eight hours after the first fit, became completely solid when heated. It contained granular and epithelial casts, and some blood-corpuscles. The patient rapidly improved, but at the end of nine weeks the urine was still smoky and very albuminous.

CASE 8.—M. M—, æt. 23, had had previously three miscarriages at from two to three months, but no labour at full time. After the first stage of labour had lasted about eighteen hours vomiting came on and the membranes ruptured, the os being only about the size of a florin. Two hours later she had a violent convulsion, and became afterwards very wild in her manner. Three more fits occurred within five hours, and she had then become unconscious and her face livid. Labour had made no further advance. Two minims of croton oil were now given, and acted freely in about half an hour. Chloroform

was afterwards administered, and under its influence the os dilated, and the head gradually descended. The administration was then discontinued, and the labour was completed naturally an hour and a half later. No convulsion occurred from the time when chloroform was first given. The child was dead, and its cuticle peeling off. The urine, examined after delivery, contained a large quantity of albumen. The patient recovered rapidly, and the albumen disappeared in three days.

CASE 9.—A. K—, æt. 36; fourth confinement. The first stage of labour had lasted about seven hours, the membranes not being ruptured, the pains very strong and frequent. The pains then decreased in severity until they ceased entirely. During the next twelve hours she had two fits, and after that they increased in frequency. At the end of two hours more she was found completely comatose, convulsed every ten minutes, the breathing stertorous, pulse 150. The os was dilated, the membranes not ruptured. The urine was drawn off, and found to be highly albuminous. The membranes were then ruptured, and chloroform administered until the birth of the child, which took place naturally in about two hours, the pains having recommenced after the rupture of the membranes. The child, a female, was stillborn. The mother remained unconscious for fifty hours in all, but ultimately recovered.

CASE 10.—E. S—, æt. 34; eleventh confinement. Dead male child. Mother recovered. Details wanting.

CASE 11.—M. B—, æt. 21, primipara. She had been subject to fits since she was fifteen years old, but had none since her marriage, nine months before. Soon after the commencement of labour pains she fell in an epileptiform fit from the chair on which she was sitting. Other convulsions followed, and the intervals became as short as ten minutes. Between the fits she was very unruly and delirious. Chloroform was administered, and had the effect of shortening the fits, and rendering the intervals longer. Labour advanced very slowly, but was completed naturally, the administration of chloroform being continued in greater or less degree until its conclusion. The child, a female, was living. The urine was tested when the fits were most severe and was found to be free from albumen. When it

was tested, however, the next day, a little albumen was found. The quantity of albumen continued to increase, but the patient's health improved.

CASE 12.—S. B—, æt. 19, primipara. Labour was very tedious, and convulsions occurred two hours after delivery. Living female child. Mother recovered.

CASE 13.—J. F—, æt. 33, ninth confinement. Mother had convulsions for forty-four hours. Recovered. Living male child.

CASE 14.—L. B—, æt. 33, primipara. Died from eclampsia ten days after delivery. Dead male child. No details reported.

CASE 15.—E. M—, æt. 24, primipara. Had epileptiform convulsions during labour. The child, a male, was dead, and appeared to be of not more than seven months' development. Mother recovered.

CASE 16.—J. C—, æt. 24, primipara. Some swelling of feet had occurred during pregnancy, and micturition had been frequent. Two convulsions occurred before delivery; the second happened while the head was on the perinæum, and caused laceration of that part. The child, a male, was living. The placenta was firmly adherent, and several more convulsions took place during its extraction, which, on this account, was effected with great difficulty. A few hours after labour convulsions began to recur with increasing frequency, and she became comatose in the intervals. A drachm dose of chloral was given without any apparent effect on the frequency or violence of the fits. Chloroform was then administered, and she was kept under its influence for twelve consecutive hours. After this the fits did not recur, and she continued steadily to improve. Urine albuminous.

CASE 17.—S. B—, æt. 25; second confinement. Her first child had been stillborn at the seventh month. Two years before she had been frightened by her dress catching fire, and since then had been subject to epileptiform fits, and to idiotic changes of humour. After the first stage of labour had lasted some hours she had a severe convulsion. After this she became completely unconscious, pupils fixed and dilated, breathing stertorous, and face livid; pulse 120, full and hard. The legs were slightly œdematous; the urine was drawn off,

and found to contain a good deal of albumen. The os was moderately dilated. After about two hours she had a second violent convulsion. Chloroform was then administered, and she was kept fully under its influence for eleven hours. After this she slept almost continuously for nearly twenty-four hours, but then began to be irritable and maniacal, although there had been no recurrence of the fits. At this time the membranes were ruptured. Strong labour pains came on immediately, and in three hours she was delivered of a dead and decomposed male foetus. The patient recovered well, and the albumen entirely disappeared from the urine on the second day after delivery.

CASE 18.—A. F—, æt. 14, primipara, a broad-shouldered, well-developed girl, had been seduced by her cousin, and appeared to feel her position acutely. She was delivered of a fine living female child after a labour of more than forty-eight hours' duration. Seven hours after delivery she had a violent epileptiform convulsion, followed by deep comatose sleep. Her appearance was anæmic, but it was found that an attempt to examine the state of the uterus produced a fresh convulsion. Chloroform was administered, and the uterus was found to be relaxed, and distended with clots. These were emptied out, and the uterus syringed out with one part of Liq. Ferri Perchlor. Fort. to eight parts of water. The pulse was 120, weak and compressible. Brandy and beef tea were administered. Within the next eight hours she had five more fits, which were cut short by chloroform. A dose of forty-five grains of chloral was then administered, and twenty grains more half an hour later. The pulse rose to 140, but became more full. She slept placidly for three hours, and then took another half-drachm dose of chloral, and from that time she improved rapidly. The urine never contained any albumen, but there had been some œdema of the legs before labour. The child died in two days, having had convulsions continually since birth.

CASE 19.—E. D—, æt. 19, primipara; was delivered naturally of a living female child. Delivery was followed by slight post-partum hæmorrhage. The next day she was unable to pass urine, and it was drawn off by catheter. On the third day she complained of headache, and on the evening of the fourth epilepti-

form convulsions commenced. They were repeated at intervals of a few minutes, but were rather slight in character. The tongue was not bitten, and there was no foaming at the mouth. She was treated by the hypodermic injection of one third of a grain of acetate of morphia. After this only three convulsions occurred, and those very slight, and she recovered rapidly. A sample of urine before the convulsions occurred was found to be high coloured, containing urates, but no albumen; sp. gr. 1037. Another sample drawn off after the convulsions contained albumen, proportion one eighth after settling, and a large quantity of urates, sp. gr. 1032. Previous to delivery it had been noticed that the patient's face was rather puffy and her legs cedematous. A year before she had an epileptiform fit after an attempt at the extraction of a tooth.

CASE 20.—M. L—, æt. 32; eighth confinement. The patient was delivered of a living female child after a perfectly natural labour, and at the end of the week appeared well. On the fourteenth day she was seized with a convulsive fit and died. No previous symptoms had been noticed except that, on the day of her death, she did not take much notice of what was going on. An autopsy was made forty hours after death. The uterus was normal and there was very slight fatty degeneration of the heart; there was no clot in the pulmonary arteries. The calvarium being removed, there was found a lobulated tumour, about the size of a hen's egg, growing from the inner surface of the dura mater, and pressing upon the anterior part of the brain in the middle line. On microscopic examination its structure was found to be that of spindle-celled sarcoma.

CASE 21.—M. H—, æt. 40; twelfth confinement. Patient first had an epileptic fit at the age of seventeen, and fits had recurred at intervals varying from three to six months. After her second confinement she had convulsions for five or six days. For some years her intellect had been gradually becoming impaired. Convulsions commenced at about the eighth month of pregnancy. No assistance was sent for until they had continued for four days, and the patient had been quite unconscious for three days. The fits were then recurring every eight or ten minutes. The os was found to be dilated. The membranes were at once ruptured, and a living male child was expelled in a few minutes. There was no increase in the violence or

frequency of the convulsions during labour. They still continued after delivery, and five hours after the completion of labour chloroform was administered. The pulse was then 118, temperature 100·5°. The urine was withdrawn by catheter, and showed a cloud of albumen, but no casts were found; sp. gr. 1020. Chloroform reduced the pulse to about 80, but completely restrained the fits only when given in the fullest degree. The patient was kept under its influence for five hours, at the end of which time she became somewhat more conscious. It was then intermitted for six hours. During this time fits again occurred about every ten minutes and were very violent, lasting three or four minutes. The face became intensely livid and the respiration laboured and slow. Chloroform was then again administered continuously for nine hours, fits recurring as soon as its influence was allowed at all to pass off. At the end of that time she appeared moribund, and died two hours after the administration was discontinued. An autopsy was made, and the kidneys were found to be hard and deeply congested. They were not examined microscopically. The uterus was normal.

CASE 22.—L. S—, æt. 17, primipara; seduced. Labour pains commenced somewhat before full time in consequence of a fright. Three days after the os was only the size of a sixpence; pulse 78; membranes not ruptured. After two days more the os had reached the size of a half-crown, membranes still unruptured. The pulse then rose to 110, and a convulsion occurred. Chloroform was administered, and a second fit occurred while she was being brought under its influence; pulse 125—130. The chloroform was continued for about four hours, and digital dilatation of the os was practised. The labour began to progress, and the pulse fell below 100; the patient being sensible when allowed to come round from the chloroform. Fifteen minims of *Liq. Opii Sedativ.* were given, and chloroform was discontinued. Two hours and a half later a third fit occurred, soon followed by a fourth, after which the pulse was 130—135. The os was then dilated, and a living female child was quickly extracted by forceps, chloroform being again administered. The patient remained comatose, with stertorous breathing. She was partially roused by the insertion of a piece of ice into the rectum, but a repetition of the same measure

brought on a fifth convulsion, which was followed by others in rapid succession, notwithstanding the use of chloroform. She died six hours after delivery. No specimen of urine was obtained.

CASE 23.—S. E—, æt. 28; third confinement. When assistance was summoned the patient was found comatose, with rigid limbs, contracted pupils, and suffused conjunctivæ. Soon after she had an epileptic convulsion, and another was brought on by a vaginal examination. The child's head was at the outlet of the pelvis, but made no advance, owing to the absence of pains. Forceps were applied, and a living female child readily extracted, chloroform being administered during the operation. There was considerable post-partum hæmorrhage. About half an hour after delivery the mother's breathing became suddenly shallow, and shortly ceased altogether. As the pulse was still very fair, artificial respiration was used for half an hour, with the effect of keeping up the pulse for nearly twenty minutes, after which the heart's action slowly died away. No specimen of urine could be procured, and no autopsy was made.

CASE 24.—E. H—, æt. 20; primipara. Labour natural and not protracted. Ten minutes after delivery a convulsion occurred, but the patient was afterwards quite conscious; pulse 60. At the end of ten hours she had had five fits, and was not fully conscious, but as the pulse was only 65 the extern who had attended the case did not consider the matter of any consequence. The patient's friends afterwards called in a medical man in the neighbourhood, and no further advice from the hospital was sought until eighteen hours after delivery. She was then found comatose, breathing stertorous, conjunctivæ insensitive; pupils contracted and not affected by light; pulse 180, temperature in axilla 107° , respiration 35. The urine was withdrawn by catheter and found to be high coloured, loaded with albumen, containing a large number of granular casts; sp. gr. 1021. The surface was sponged with water at a temperature of 95° , with the effect of reducing the temperature in the axilla to 104° , but that in the vagina was found to be 108.8° . The patient died twenty hours after delivery. No œdema had been noticed previous to labour. No autopsy could be procured.

CASE 25.—J. C—, æt. 24; second confinement. Labour was completed naturally, but about an hour afterwards an epileptiform convulsion occurred. After the fit the patient was rational, but appeared hysterical; pulse 88. No recurrence took place for five hours, but then a second convulsion occurred. This was followed by seven more within five hours. The patient had then become unconscious in the intervals, and the tongue had been bitten severely; temperature 101° ; pulse 110. The urine was drawn off, and found to contain albumen, proportion after settling more than three quarters; numerous granular casts were also found. Chloroform was administered and sphygmographic tracings were taken while she was fully under its influence, and also when she was allowed partially to come to. The latter showed an arterial tension much greater than normal. When she was fully under the influence of chloroform the tension was much diminished. After two hours the chloroform was discontinued; temperature 99.8° ; pulse 96. A dose of a minim and a half of croton oil was then given, and afterwards Chloral Hydrat. gr. xx, with Potass. Bromid. gr. xx. The patient rapidly recovered, and next day the proportion of albumen in the urine was diminished to one tenth, and there were no longer any casts. Four days later she was convalescent, but there was still a trace of albumen.

CASE 26.—A. P—, æt. 22; third confinement. Patient had been subject to fits when a child, but they had never returned until four months previously, when she had them very severely. When first seen the initial stage of labour had continued about nineteen hours, and she had had several epileptiform fits. She was found completely comatose, pupils sluggish and somewhat contracted, face and nails deeply congested. The os was dilated to the size of a half-crown, membranes entire, vertex presenting; pulse 136, temperature 100.4° . The urine was drawn off, and found to be of a deep port-wine colour, becoming almost solid on heating. It contained numerous epithelial casts and a large quantity of blood. Chloroform was administered for about two hours, at the end of which time the pulse was 120, temperature 98.8° . The os at this time remained unexpanded, but a few minutes later it suddenly became fully dilated, and in ten minutes a dead male child was expelled. The convulsions did

not recur, and twelve hours after the urine was of a pale straw colour, the albumen much diminished in quantity. The patient made a good recovery. On the third day the amount of albumen was reduced to a trace, but after five days more the trace was still found; sp. gr. 1010.

Puerperal Mania.

Three cases are recorded, all of which ended fatally. Maniacal symptoms also occurred in one fatal case of puerperal peritonitis.

CASE 1.—Æt. 21; first confinement; seduced, but married two weeks before delivery. On third day she wandered in her mind, and on the fourth suddenly began to scream and talk wildly. She then fell asleep and afterwards appeared well until the ninth day, when she was scolded by her father. She then became violent occasionally, and in the intervals morose and suspicious, and declined her food. She showed great aversion from her husband, and also from the child, which she frequently tried to injure. On the tenth day she was talking incoherently. The urine, which had not been passed for two days, was drawn off, and found albuminous; pulse 140. She improved somewhat for several days, but died on the sixteenth day.

CASE 2.—Æt. 35; third confinement. Mania came on a week after delivery and the patient eventually died from exhaustion.

CASE 3.—Æt. 31; fifth confinement. Rather severe post-partum hæmorrhage occurred after delivery. Symptoms of mania appeared on the fourteenth day. On the eighteenth day signs of pneumonia were found at the bases of both lungs, and on the twenty-seventh day she died.

Puerperal Peritonitis and other forms of Septicæmia.

Thirty-four fatal cases of this disease occurred, two of which are reported under the head of post-partum hæmorrhage, and two under that of adherent placenta. The remainder, with some of the more interesting cases which ended in recovery, are recorded below. It is impossible to give any estimate of the actual frequency of the disease, on account of the difficulty of

distinguishing the milder forms of it from the ephemeral kinds of febrile disturbance which do not depend on any blood poison. Among the fatal cases reckoned under the present heading are some in which the cause of death was doubtful, such as Cases 33 and 34. The proportion to the whole number of cases is 1·4 per 1000, or 1 in 694. If to these be added those cases in which death occurred with symptoms of septicæmia after any obstetric operation or after placenta prævia, the total number will be 41, which is 1·7 per 1000, or 1 in 575. The percentage in the last report of nine years was 1 in 676, in the preceding twenty-one years it was 1 in 234. There has thus been a slight increase in the mortality of the various forms of puerperal fever as compared with the last report, but it is satisfactory to record that there is no instance in which contagion seemed to have been communicated by the attendant from one patient to another. It is usual to suspend an extern from his duties for a few days, if symptoms occur in any patient attended by him which are thought to indicate any special risk of infection. In the case of the resident obstetric assistants, who are not generally in such close attendance upon the patients, reliance is placed upon antiseptic ablutions and change of clothing. The nearest approach to an epidemic was in November and December, 1874, when there were four deaths from puerperal septicæmia among patients delivered within four weeks. All four, however, were attended by different gentlemen, and no communication whatever could be traced between them.

There is one instance (Case 10) in which the infection of scarlet fever, derived from a child placed in the same bed, produced a disease having none of the specific characters of the fever, and indistinguishable from puerperal peritonitis. It would seem, therefore, so far as any inference can be drawn from a single case, that such a transformation in the manifestations of the disease does not depend upon the poison being introduced into the genital passages. It is somewhat remarkable that there is no instance among the 23,591 deliveries of scarlet fever occurring after labour, nor has any death been due to such a cause among the 37,369 deliveries included in former reports. It is possible that, in other cases besides the one referred to above, puerperal peritonitis may have been due to

the poison of scarlet fever, but comparing this result with the statistics obtained by Dr. Braxton Hicks from consulting practice, in which, out of 89 cases of grave febrile disturbance after labour, 20 showed the symptoms of scarlet fever, and at least 15 others were traced to the infection of that disease, we can hardly avoid connecting it with the fact that the patients are attended by gentlemen who are not engaged in general practice. One case of septicæmia seemed to be due to the poison of gonorrhœa contracted fourteen days before delivery. In two cases diphtheritic deposits were seen on the throat at a late stage of the disease, shortly before death.

The day of attack varied from the second to the fifth, the third being the commonest. In two cases the disease ended fatally within two days from its commencement. The earliest death took place on the fourth day, the latest on the thirty-third. Cases which were distinctly autogenetic, such as those which occurred after adhesion of the placenta, seemed to run a more protracted course and to be less fatal.

There was one remarkable instance of recovery, under treatment by 160 grains of quinine in the twenty-four hours (Case 32). The patient's pulse had reached 160 when the treatment was commenced, and for more than three weeks it remained above 140.

Considerable post-partum hæmorrhage occurred in four of the cases recorded below, and there were also two deaths from septicæmia among the cases reported under the heading of post-partum hæmorrhage.

CASE 1.—Æt. 24; second confinement. Patient contracted gonorrhœa from her husband fourteen days before her delivery, which was normal. On the third day she had abdominal pain and tympanitis, lochia and milk ceased; pulse 130; bowels confined. For three days she appeared in danger, but from that time improved, and was convalescent in ten days. *Treatment*.—Calomel and opium, with vaginal injections.

CASE 2.—Æt. 31; fourth confinement. The labour was very easy, but the child was stillborn. Its movements had ceased two days before. Mother did fairly well till the fifth day, when she was attacked with abdominal pain and tympanitis, with diarrhœa; pulse 120. The diarrhœa continued, and vomiting was soon added. On the eighth day palate and

tonsils were covered with diphtheritic deposits. She died on the tenth day. *Treatment.*—Opium and cinchona, with vaginal injections.

CASE 3.—Died from puerperal septicæmia. Details wanting.

CASE 4.—Æt. 25; first confinement. Died from puerperal septicæmia.

CASE 5.—Æt. 28; sixth confinement. Labour easy. She had a slight rigor on the second day, but seemed doing fairly well until the morning of the fourth day, when she was seized with vomiting, became collapsed, and died the same afternoon.

Post-mortem.—Pus was found in the peritoneal cavity, especially about the pelvis, and there were purulent deposits in the Fallopian tubes, reaching to the substance of the ovaries. No pyæmic deposits in the viscera.

CASE 6.—Died from puerperal peritonitis.

CASE 7.—Æt. 30; first confinement. Labour was somewhat protracted, and ergot was administered. She did well up to the fifth day, when symptoms of septicæmia appeared, and she died on the eighth.

CASE 8.—Æt. 37; fourth confinement. Died from peritonitis on the seventh day.

CASE 9.—Æt. 22; first confinement. Died from puerperal septicæmia.

CASE 10.—Æt. 31; fourth confinement. Immediately after delivery a child convalescent from scarlet fever was placed in the bed with her. She afterwards died with symptoms resembling those of puerperal peritonitis.

CASE 11.—Æt. 29; third confinement. Was removed into the hospital, where she died from peritonitis.

CASE 12.—Æt. 20; second confinement. Died from peritonitis fourteen days after delivery.

CASE 13.—Æt. 30; sixth confinement. Was suffering from phthisis, and had symptoms also of peritonitis. She died on the tenth day.

CASE 14.—Æt. 39; second confinement; after an interval of sixteen years from the first. Labour was normal. On the second day she carried some pails of water from the bottom to the top of the house, five stories high, and on the third she did a day's washing. On the fifth day she became feverish; pulse 100. On the seventh day the pulse was 160; lochia scanty;

No tenderness of abdomen. She became delirious, and died on the eighth day.

CASE 15.—Æt. 35; tenth confinement. Hæmorrhage occurred after delivery, but was checked by ergot and the introduction of the hand into the uterus. The patient afterwards sank into a low typhoid condition, and died at the end of a week.

CASE 16.—Æt. 39; eighth confinement. Severe post-partum hæmorrhage occurred before the arrival of assistance. The patient got up, and went about the house on the third day. She afterwards had symptoms of broncho-pneumonia, with some abdominal pain, and died on the eighth day. Milk and lochia continued till within a few hours of her death.

CASE 17.—Æt. 21; first confinement. Labour was completed naturally, but the perinæum was ruptured. Patient died at the end of four and a half weeks from a low form of septicæmia.

CASE 18.—Æt. 26; fourth confinement. Died from puerperal peritonitis.

CASE 19.—Æt. 26; first confinement. Died on the ninth day from peritonitis.

CASE 20.—Æt. 23; first confinement. Died on the sixteenth day from peritonitis.

CASE 21.—Æt. 23; second confinement. On the fifth day the pulse rose to 120; temperature 98·8°; respiration 36. The abdomen was distended, but there was scarcely any pain or tenderness. Next day the pulse was 170; temperature 101·9°; respiration 44. During the following night the patient died. *Treatment*.—Quinine in large doses.

CASE 22.—Æt. 30; seventh confinement. Was attacked on the second day with fever and uterine tenderness, which went on to pelvic cellulitis.

CASE 23.—Æt. 29; second confinement. On the third day had rigors, and tenderness in the iliac region; pulse 140; temperature 104°. On the fourth day the pain was relieved; pulse 108; temperature 100·5°. On the fifth day shivering recurred; pulse 120; temperature 103·5°. Milk plentiful. A little later a rash of miliary vesicles appeared on the chest, and after two days all febrile symptoms had disappeared.

CASE 24.—Æt. 20; first confinement. Labour normal. On

the third day the abdomen was distended and painful, and there was profuse diarrhœa. Lochia scanty and foetid; pulse 120; temperature $104\cdot4^{\circ}$. Diarrhœa and vomiting continued for two days, after which she began to improve, and was convalescent at the end of a fortnight. *Treatment*.—Quinine and opium, with antiseptic injections. She was attended by her sister, aged 19, newly married, looking healthy. About three weeks after her delivery this sister was admitted into the hospital with laryngitis, for which tracheotomy was performed with a successful result.

CASE 25.—Æt. 24; third confinement. Died on the eleventh day from septicæmic pneumonia.

CASE 26.—Æt. 30; first confinement; seduced. On the second day she was injudiciously exposed to cold by the nurse, and from this time had protracted and repeated rigors. On the third day she had severe hypogastric pains; lochia very scanty, rather offensive. On the sixth day diarrhœa commenced, and lasted for two days, after which it was checked by opium; pulse 130—140; respiration 40—50; temperature 105° . She sank and died on the ninth day.

CASE 27.—Æt. 34; sixth confinement. Patient lived close to a slaughter-house. Labour normal. Some hæmorrhage took place two hours after delivery, but was checked by ergot. On the third day a severe rigor took place, after which she was found feverish. Pulse 126; temperature 105° ; scarcely any tenderness of abdomen; milk free; lochia not offensive. Twelve hours later lochia became scanty and offensive. On the fourth day there was tenderness of the abdomen and diarrhœa. The patient was naturally excitable, and suffered from delirium, with symptoms resembling mania. She died on the seventh day. *Treatment*.—Sulpho-carbolate of soda, quinine, opium, and intra-uterine injections.

CASE 28.—Æt. 34; third confinement. Labour normal. A rigor occurred on the second day. On the third there were severe abdominal pain, vomiting, and diarrhœa; pulse 132; temperature $101\cdot4^{\circ}$; lochia rather offensive. She died on the sixth day. *Treatment*.—Opium and sulpho-carbolate of soda.

CASE 29.—Æt. 20; first confinement. Labour normal. On the third day she was attacked by abdominal pain; temperature 103° ; pulse 148; lochia rather scanty. Bowels were rather

confined throughout and lochia never became offensive. On the fifth day, and again twice in the third week, the temperature rose above 105° , but was diminished after the administration of full doses of quinine. On the twenty-third day temperature fell below 101° , and on the thirty-first day she was admitted into the hospital, where she ultimately recovered. *Treatment*.—Opium and quinine.

CASE 30.—Æt. 40 ; tenth confinement. Labour easy. Suffered from cough before delivery. On the second day had slight rigor, and on the third the abdomen was somewhat tender; lochia scanty. On the fourth day there was much dyspnoea, and loud mucous râles all over the chest; temperature 101.6° ; pulse 135. From this time the symptoms were those of bronchopneumonia rather than of peritonitis, and she died on the seventh day. *Treatment*.—Opium with full doses of quinine.

CASE 31.—Æt. 21 ; first confinement. Labour normal. On the third day had severe rigors, followed by vomiting and abdominal pain; temperature 101° ; pulse 120. On the fourth day the abdomen was tympanitic; temperature 102° ; pulse 135. There was no diarrhoea, but she died on the seventh day. *Treatment*.—Opium.

CASE 32.—Æt. 21 ; first confinement. Labour normal. On the third day had slight rigor. On the fourth day was delirious; temperature 103° ; pulse 120. The same evening she appeared to be dying; temperature 105° ; pulse 160; extremities cold. She was ordered ten grains of quinine with brandy, at intervals of an hour and a half, after which she began to improve. Up to the twenty-eighth day the pulse still remained over 140; a large bedsore had formed; she was frequently delirious, and kept down scarcely anything except the quinine. She was then removed to the hospital, where she ultimately recovered.

CASE 33.—Æt. 28 ; second confinement. The placenta was retained, and was removed by the hand from the uterus. Some hæmorrhage had occurred in the meantime. She did well until the fifth day. On the sixth day she had pain in the right chest; pulse 120; temperature 101° ; no abdominal tenderness; milk diminished; lochia normal. The next day she died. No autopsy was permitted, and the cause of death remained uncertain.

CASE 34.—Æt. 19 ; first confinement. Labour was com-

pleted naturally, but the perinæum was ruptured. Sutures were put in immediately. She did well until the third day, when the pulse rose to 128; temperature 104.8° ; respiration 32; slight abdominal tenderness; milk and lochia free and natural. On the sixth day she was seized with intense pain in the right chest, and extreme dyspnœa. The base of the right lung was dull on percussion. The same evening she died. No autopsy was permitted.

CASE 35.—Æt. 21; first confinement; seduced. Labour was normal, but the child was weakly and died twenty-four hours after. On the fifth day there was some abdominal tenderness; pulse 140; temperature 103° ; lochia almost ceased. On the ninth day diarrhœa came on, and she died on the eleventh. *Treatment.*—Opium and quinine.

CASE 36.—Æt. 32; seventh confinement. Labour easy. On the third day abdominal pain, tympanitis, and vomiting came on; pulse 130; temp. 102.4° . She had been drinking freely of gin and brandy. She died on the seventh day. *Treatment.*—Opium and quinine.

Zymotic Diseases.

Nine cases of zymotic disease occurred, of which two ended fatally. Three patients were suffering from variola, and were delivered during the course of the disease. One of these died two days after delivery. Two patients were attacked by variola after delivery, both of whom recovered. There was a fatal case of typhoid fever, which commenced before labour, and one of typhus fever which began on the sixth day after labour, and ended in recovery. There was one case of scarlet fever at the sixth month of pregnancy. The patient miscarried, but recovered well. One patient passed favorably through an attack of erysipelas of the face, which commenced on the tenth day after delivery.

CASE 1.—Æt. 46; ninth confinement. Labour was protracted in consequence of ankylosis of the coccyx. She did well till the sixth day, when febrile symptoms came on. On the tenth day she had become extremely deaf, pulse 120, and the rash of typhus fever was recognised. There were cases of the same disease in an adjoining house. She was removed to the hospital, and recovered.

CASE 2.—Æt. 40; eleventh confinement. A few days after delivery she took variola, but did well. The child also took it and died twelve days after.

CASE 3.—Æt. 34; eighth confinement. Patient was living in a filthy hovel, in which typhoid fever had been prevailing. Shortly before her confinement her husband and child had been removed to the fever hospital. She had febrile symptoms three days before delivery. Labour was normal and the child living. On the fifth day there was a copious eruption of typhoid spots; pulse 124; respiration 36. She died on the fifteenth day after delivery.

CASE 4.—Æt. 24; first confinement. Labour pains commenced at the eighth month of pregnancy. The first stage of labour was very protracted; and when it had lasted four days a profuse eruption of mixed nature appeared, which afterwards showed the characteristics of variola. Delivery took place two days after its appearance, and the pulse rose to 144. The pustules dried up soon after maturation, and the patient did well. The child took the complaint and died on the sixth day of the eruption.

CASE 5.—Æt. 24; first confinement. The head of the child was in an occipito-posterior position, and delivery was completed by forceps. The child was stillborn. The eruption of variola had appeared on the mother before delivery. She recovered well.

CASE 6.—Æt. 23; first confinement. Had erysipelas of the face ten days after delivery. Did well.

CASE 7.—Æt. 28; third confinement. The rash of variola appeared the day after delivery. The child was living. Mother recovered well.

CASE 8.—Æt. 40; sixth confinement. Was suffering from variola when delivered and died two days after. The child took the complaint and died in four days.

CASE 9.—Æt. 24; first confinement. Was attacked by scarlet fever when six months pregnant, and was delivered prematurely during the course of the fever. Child lived one hour. Mother recovered well.

Maternal Mortality.

Deaths from all causes occurred in 106 cases. This is equivalent to about 4·4 per 1000, or 1 in 223. The result is therefore not quite so satisfactory as the extremely low mortality attained in the last report, namely 2·94 per 1000, or 1 in 338. It is still, however, much less than the death-rate which Dr. Matthews Duncan infers from his statistics to be that prevalent among the general population, namely, one of from 8 to 10 per 1000. The mortality in the first twenty-one years was 7·1 per 1000, or 1 in 140. The greatest increase in the present report is in the number of deaths due to causes quite independent of delivery, which amounts to 15, as compared with one only in the last report. Deaths from all causes, within the time during which the patients remain under observation, are included. It is believed that the mortality is not at all underestimated, for those who suffer from any puerperal disease are often attended for a period much exceeding four weeks, and are admitted, if necessary, into the hospital. In rare cases a patient may pass out of observation; as, for instance, the one whose history is recorded under the head of adherent placenta (Case 4), who was handed over to other care, being still seriously ill, at the end of forty-eight days. But, on the other hand, the cards of some of the normal cases are not returned, and therefore not entered, and thus the total number of cases attended is really greater than that stated.

In comparing the mortality with that of similar institutions, it is necessary to remember that the benefits of the charity are not limited to married women, nor by the necessity of obtaining any recommendation, which the friendless might find it difficult to secure. It is found that a notable proportion of the fatal cases of puerperal fever or eclampsia occur in girls who have been seduced. Moreover, the district includes some of the worst neighbourhoods in London, and many of the patients live not only in extreme destitution, but under the worst possible hygienic conditions.

A classification may be made of the deaths into childbirth deaths, due to causes directly connected with labour; septicæmic deaths; and accidental deaths, from diseases quite independent of parturition, in which, however, delivery might have

hastened or determined the fatal issue. The childbirth deaths are 48, or 2·0 per 1000, of which 25, or 1·1 per 1000, were due to hæmorrhage. The septicæmic deaths are 43, or 1·8 per 1000. Of these 6 occurred after obstetric operations. The accidental deaths are 15, or ·6 per 1000. Of these 13 are recorded below : 1 under the head of version for protracted labour (Case 14) ; 1, a case of tumour of the brain, under the head of eclampsia (Case 20). In making the above classification, doubtful cases, such as those of bronchitis or pneumonia supervening after delivery, and also zymotic diseases, have been included in septicæmia ; deaths from puerperal mania have been reckoned among childbirth deaths. It will be seen that rather less than half of the deaths were due to septicæmia, and nearly a quarter to hæmorrhage. In the last report the septicæmic deaths were 23 out of 44 ; in the preceding twenty-one years they were 103 out of 160.

Table of Fatal Cases.

Puerperal peritonitis and other forms of septicæmia after labour completed naturally (including two cases of doubtful nature)	26
Variola	1
Typhoid fever	1
Post-partum hæmorrhage	12
Syncope after slight hæmorrhage	1
Septicæmia after post-partum hæmorrhage	6
Accidental hæmorrhage	5
After version for malpresentation (septicæmia)	1
After forceps { septicæmia 1 hæmorrhage 1 other causes 3 }	5
After version for protracted labour { pneumonia 1 septicæmic pneumonia 1 }	2
After craniotomy { septicæmia 3 other causes 3 }	6
Rupture of uterus or vagina	7
Inversion of uterus, with hæmorrhage	1
Placenta prævia { hæmorrhage 5 septicæmia 1 }	6
Adhesion of placenta (septicæmia)	2
Eclampsia	7
Puerperal mania	3
Phthisis	2
Pneumonia, pleurisy, and bronchitis	4
Disease of heart	4
Syncope from fatty degeneration of heart	1
Tumour of brain	1
Purpura	1
Cause unknown	1

Thirteen of the above fatal cases, which are not included under other headings, are recorded below.

CASE 1.—Æt. 30; ninth confinement. When seven months pregnant was attacked by pleuro-pneumonia, brought on by cold, and was delivered prematurely. She died two days after.

Post-mortem.—Red hepatization of the right lung was found, with lymph on the pleura, and some fluid in the left chest.

CASE 2.—Æt. 25; fourth confinement. Was suffering from heart disease, for which she was admitted into the hospital, where she died.

CASE 3.—Æt. 40; tenth confinement. Died from advanced phthisis three weeks after. Abdomen normal.

CASE 4.—Æt. 29; sixth confinement. Had complained of slight pain in the chest before delivery. Twelve hours after she brought up a large quantity of blood, and suddenly expired.

Post-mortem.—The left pleura was half full of fluid, and there was extensive apoplexy of the left lung. Heart healthy.

CASE 5.—Died from heart disease a week after delivery.

CASE 6.—Æt. 43; thirteenth confinement. Died from acute bronchitis four days after delivery.

CASE 7.—Æt. 22; first confinement. Died from purpura hæmorrhagica twenty-three days after delivery.

CASE 8.—Died unexpectedly; cause unknown. No autopsy could be procured.

CASE 9.—Died from pneumonia, coupled with a dilated heart, and mitral contraction, as verified by an autopsy.

CASE 10.—Died from phthisis two weeks after delivery.

CASE 11.—Æt. 36; ninth confinement. Died suddenly ten days after delivery.

Post-mortem.—Fatty degeneration of heart, liver, and kidneys was found.

CASE 12.—Æt. 26; first confinement. Died from heart disease on the day after delivery.

CASE 13.—Æt. 28; ninth confinement. Had suffered for some time with chest symptoms, which became worse after delivery. On the third day the pulse was 116; temperature 104°; respiration 42. There were mucous râles at the bases of both lungs, and rhonchus throughout the chest. Venous congestion gradually increased, and she died on the sixth day.

Treatment.—Ammonia and senega, with stimulants.

ON THE TREATMENT OF ULCERS

BY THE

LOCAL APPLICATION OF A WEAK CONTINUOUS
ELECTRIC CURRENT.

By C. H. GOLDING-BIRD, B.A., M.B.

As electricity holds now such a prominent place among therapeutic agents in the treatment of disease, it occurred to me that a collection of such facts as are recorded of the application of the "continuous current" (galvanisation) to open or ulcerated surfaces, together with some cases of my own, might not only be found interesting, but serve as a basis for more extended observation.

The application of the "induced current" and of static electricity to sores has been tried, and it is said with good result; but the first record, that I am aware of, of any observation upon the electro-chemical action of a galvanic current (continuous) upon animal tissues is one by Dr. Babington in 1827, and referred to by Dr. Golding Bird in his lectures delivered at the Royal College of Physicians in 1849.

The experiment consisted in taking two pieces of fresh muscle, and placing "one between two plates of glass, the other between plates of copper and zinc, and binding them together with wire. In the course of a few days, the weather being warm, the flesh between the glasses began to putrefy,

and soon afterwards was full of maggots, whilst that between the metallic plates remained free from putrescence. A remarkable change had, however, occurred, for on taking off the plates, the side opposite to the zinc plate was hard, as if it had been artificially dried, whilst that opposed to the copper had become covered with a transparent substance resembling jelly."¹

A chemical change, the result of electrolytic action, had taken place, and the same occurs in the living body; but its effects are modified or resisted in a way that will be seen when its application as a therapeutic agent is considered. When engaged in observing the value of the electric current to wounds, I repeated Dr. Babington's experiment with various metals, being desirous of obtaining a metallic surface which would as little as possible undergo disintegration, and thus avoid introducing the element of chemical change, which renders it difficult to determine how far the electric current was of itself beneficial.

The results of these experiments, with the cases to be afterwards given, appeared in the 'Guy's Hospital Gazette' during 1873, and both will be quoted from that paper, together with such remarks as may from time to time be applicable.

In each case the flesh was enclosed between different metals, which were connected by wires. Arranged like this, a single electro-motor was formed by each piece, the results being the same as though a weak current had been transmitted from an external source.

Exp. A.—Flesh enclosed between silver and lead. The appearance was much the same as with zinc and silver (*vide* Exp. E), and only marked in a less degree; beneath the silver the surface was *alkaline*; and beneath the lead, it was hard and white, but not adherent, and *acid*.

Exp. B.—Flesh between platinum foil and zinc. The platinum surface was not perceptibly changed; the zinc one was pale red in colour and very hard, the hardness extended more or less right through.

¹ 'Lectures on Electricity and Galvanism,' by Golding Bird, M.D., F.R.S. Longmans, 1849, p. 135.

Exp. C.—Flesh between magnesium and silver. The only change here was on the magnesium surface; the metal was disintegrated, partly converted into a grey white powder, while the flesh appeared eroded.

Exp. D.—Flesh between tin and platinum. No change on the surface: on cutting it across, the parts between the plates appeared well preserved, while the projecting edges were discoloured and decomposing.

The curious changes observed in Dr. Babington's experiment are easily explained, and serve to show what had occurred with the other metals. On contact being made between the wires connecting the two plates, a current was established at the expense of the more electro-positive of the two plates; in fact, a battery was formed in which the moisture in the flesh constituted the exciting liquid. The salts contained in it were decomposed; of these chloride of sodium was the most important; the chlorine, passing to the zinc, combined with it and formed the powerful escharotic, chloride of zinc, which, by coagulating the albumen, caused the hardness, while the sodium passing to the copper or electro-negative plate, there formed with the albumen an albuminate of soda. In each of the other experiments similar changes can be traced, unless it be in *Exp. D*, where nothing but its preservative action seems to denote the passage of an electric current; but tin and platinum stand very near one another in the list of electro-negative elements, though the former is really electro-positive to the latter. The conclusion seems to be, that, of all the metals tried, silver is the least irritating in its chemical action—supposing that we exclude platinum, of which the costliness is against its general employment on a large scale.

A powerfully preservative action is shown in each case. Where zinc was employed, the chloride formed in the experiment would have assisted in this result, but in *Exp. D* nothing of the kind interfered with the electric current.

The topical effect of this electrolytic action on the living body will be seen in the four following cases. The first is one, an account of which was published in 1849, under the care of Dr. Golding Bird in this hospital; the others were

patients on whom I had the opportunity of observing the action of the silver and zinc plates. The method of applying the plates will be seen from the reports of the cases; the silver employed was ordinary foil; the zinc somewhat thicker, a small piece of the latter was used the size of a halfpenny, as the resulting sore was never smaller than the plate employed; to each a copper wire was soldered.

CASE 1.—In December, 1847, a patient was admitted into Naaman Ward with hemiplegia of the right side; and on January 15th, 1848, had so far recovered as to be able to walk about the ward; but making no improvement up to the 18th, it was determined to try the effect of a local and constant application of a weak galvanic current to one of the extremities.

The right arm was chosen, and two blisters were formed, one below the deltoid muscle, the other on the back of the wrist; over the former a plate of zinc was fixed beneath an ordinary water dressing, and a silver plate was similarly applied over the latter; the two were then connected by a copper wire. On making this connection a tingling was felt under the silver plate. The report of this patient as far as the present subject is concerned is:

January 19th, 3 a.m.—Experienced severe pain in the arm, that soon wore off.

Evening.—Apparatus removed; the surface of the zinc sore was coated with a firm whitish matter like lymph; nothing peculiar about the lower sore. The plates were again applied.

23rd.—Has experienced more or less pain since last report. Before taking off the apparatus Dr. Golding Bird tried whether any current were passing, but failed in obtaining any decided effect upon the galvanometer. The slough on the zinc sore appeared thicker.

29th.—The slough was separating and exuding a thin sanious pus. Apparatus discontinued. Bread poultice ordered. A faint blush was all that was left of the sore above the wrist.

31st.—Slough separated. A healthy sore resulted, which had all but healed by February 11th.

CASE 2.—E. B—, æt. 51, in Martha Ward, under Mr. Birkett's care for an ulcer on outer side of left ankle, which had followed her confinement four years ago. She was first seen on Tuesday, the 25th March, 1873. Ulcer indolent in character, not skinning, discharging offensively; edge hard, white, and raised. 9 p.m.—Silver plate applied over ulcer, and zinc plate, the size of a halfpenny, applied to the leg below the head of the fibula, the skin under the latter having been previously bathed with hot salt and water; over each plate was placed a layer of gutta-percha tissue, which was then strapped and bandaged firmly down. Two insulated copper wires, one from each plate, were passed through the bandage and fastened together outside. The astatic needle galvanometer introduced into the circuit showed no current. No pain.

26th, 10 a.m.—No change felt by patient; no pain. 9 p.m.—No current shown by galvanometer. Plates now removed. No change under zinc plate. Ulcer as at first, excepting that the pressure of the silver plate had somewhat reduced the thickness of the edges. The discharge was white, purulent, and offensive. A spot the size of a sixpence was blistered below head of fibula. Cold water dressings to ulcer.

27th, 10 a.m.—The blister having been cut, the plates were reapplied, the zinc being placed directly on the exposed cutis. Galvanometer needle deflected about 8° . 9 p.m.—Patient complains of pricking pain at silver plate. No muscular action. Deflection of needle 5° .

28th, 10 a.m.—Pain under both plates, especially under zinc one on pressure. Deflection 10° . 9 p.m.—Deflection 5° . Plates removed. Under the zinc the blistered surface was covered by a dry, white, horny, and adherent eschar, surrounded by a slight blush for a short distance. On pressure a little serous fluid oozed from beneath it. Under the silver a border of new skin was found around the ulcer, one eighth of an inch in depth, the hard white edge no longer remaining. The greatest length of the old ulcer was now one and a quarter inch. The discharge was very slight in quantity, less purulent, not offensive, but sanguineous.

29th, 11.30 a.m.—Deflection of needle 8° . Burning pain beneath the zinc plate. 9 p.m.—Deflection 5° . Plates

removed. Eschar as at last report, not separating; dry lint applied; ulcer skinning well; greatest length one inch. Discharge slight, sanguineous. Dressed with wet lint.

30th.—Eschar dry, of a greenish colour. Ulcer skinning rapidly. From this date the patient did well up to the time of her discharge on April 13th. The ulcer healed a few days after the last report, and the eschar on separating left a deep, sharply cut, and painful sore, which, however, rapidly granulated up, and was nearly closed when the patient left the hospital.

CASE 3.—The patient was a girl, under Mr. Birkett's care in Martha Ward. She had been admitted for a tumour occupying the upper part of Scarpa's triangle on the left side. This was excised, and the edges of the wound were brought together after the operation; but subsequently separating, an open wound was left, which showed no disposition to heal, and when I first saw it had been in the same condition for the past five weeks, and seemed no nearer closing than at the commencement of that time. The first observation was made on March 29th, 1873. The ulcer then was light red on the surface, in part covered with small granulations, but the edges were sharply cut, and presented no appearance of skinning. The discharge from the surface was copious, purulent, and free from blood. The ulcer, which was irregularly ovoid in form, had a long diameter of two inches. A small surface close to Poupart's ligament *above* the ulcer the size of a sixpence, was painted with Liq. Epispasticus (B. P.) and left to blister under a piece of gutta-percha tissue.

30th, *morning*.—Blister was cut, and a piece of zinc foil with a copper wire attached was firmly strapped upon the open surface, the cuticle being previously removed. A silver plate was fixed also over the ulcer, and the electrodes being connected with the galvanometer, the needle showed a deflection of 27° . The current was also detected by the tongue.

Evening.—Complained of smarting under zinc plate. No contraction of muscles of thigh.

31st, *morning*.—Pain experienced under the silver plate at the seat of the ulcer. None at all under the zinc plate.

Evening.—The plates were removed after being on thirty-six hours. The ulcer was now found to have lost its defined and well-cut edges and to be skinning rapidly, one quarter of an inch of new skin in parts being formed. Its greatest length was $1\frac{1}{4}$ inch, while its surface, though very red, was covered with the healthy granulations.

April 1st.—Ulcer skinning rapidly; greatest length $1\frac{1}{4}$ inch. Discharge purulent, non-sanguineous; eschar under zinc. As the treatment seemed so successful a fresh surface, the size of a sixpence, was blistered 3 inches *below* the ulcer.

2nd.—No current or scarcely any to be detected by the galvanometer. The plates were removed; the surface beneath the zinc was covered with a thick, hard eschar, beneath which some serum oozed; the surrounding skin was much inflamed and tender. The zinc plates after being cleaned were transferred to the freshly blistered surface. Deflection now 12° . The ulcer was skinning well and uniformly; greatest length $1\frac{1}{4}$ th inch.

4th.—Plates removed for good; the ulcer was not half its original size, while the two blistered surfaces were sore, red, inflamed, and covered with thick white eschars. Water dressing to ulcer. The other places were dressed with zinc ointment.

This patient was discharged on April 12th, the ulcer being less than the size of a sixpence; the sores produced by the plates were not quite healed, but had been granulating up well ever since the eschars separated; and this occurred about the fifth day from their formation.

CASE 4.—This patient was an engine-driver, and was admitted into Job Ward, under Mr. Bryant, for an ulcer on the sole of the foot, the result of injury. He had been treated for it in various ways during some months, and according to his own account, without the slightest improvement whatever. The fact of its having been scarified by a medical man three weeks before his admission, pointed to the same condition of the ulcer that existed when seen here. Before I saw him the edge of the ulcer had been blistered, but without any good result.

March 11th, *evening.*—Ulcer 2 inches by $1\frac{1}{2}$ inch on sole

of left foot, and extending upwards on the instep. It is stated to have never been smaller than it is at present, though treated for some months; it has a raw and only partially granulating surface, deeply seated below the level of the skin, but not undermining it; the edges are hard, raised, thick and deeply cut, and at no point is there any sign of skinning: there is a purulent discharge from the surface. A silver plate with its electrode was now applied over the ulcer in the usual way; while upon the skin, previously softened by bathing, just below the head of the fibula, a small piece of lint wetted with salt and water, and covered by the zinc plate, was fastened.

The electrodes being attached to the galvanometer no current at all was indicated. The silver plate was then placed in the patient's mouth, the zinc being retained as before, but no current was found passing. The silver plate being again adapted to the sore, the zinc plate was removed and held in the mouth, and the needle now described an arc of 90° , showing the existence of a strong current. [This proved that the zinc plate was the one at fault. The mucous membrane of the mouth acts like the exposed cutis after blistering.] The place occupied by the zinc was now blistered.

29th, *morning*.—Zinc plate placed over blistered surface (the cuticle being removed), the silver one over sore. Needle deflected 25° .

Evening.—To see if all were well, the electrodes were attached to the galvanometer. No evidence of current obtained, neither was any "tasted." On removing bandages the zinc plate was found to have slipped from the blistered surface. On replacing it a deflection of 20° was registered. Silver plate not removed.

30th, *evening*.—Pain under zinc plate. On removing this plate, a white hard eschar was seen. The ulcer under silver plate more healthy. Discharge sanguineous. On the upper edge, one or two bright red vascular spots appearing. Below, it is commencing to skin.

31st, *morning*.—Needle deflected 20° ; current "tasted" also. Burning pain under zinc and pricking under silver plate. There has been no muscular action at all.

April 2nd.—Deflection only 5° . [This was owing to the complete formation of the eschar, and consequent insulation of the zinc plate.] Plates removed for good, owing to the pain and irritation caused by the zinc; the parts surrounding were deeply inflamed for some distance. Ulcer now skinning all round, but not to any depth; healthy granulations cover its surface. As the plates could no longer be applied owing to the irritation set up by the zinc, and as the ulcer had now a very healthy appearance, Mr. Bevan, the dresser, transplanted, and, as the sequel showed, with the greatest success. Every transplantation took, and on the patient leaving the hospital four weeks later, the ulcer was less than half its original size, while the sore above, which did not heal after the separation of the eschar till a large slough had come away, was closed all but a spot the size of a pea. At one time the inflammation arising from the zinc plate spread half way down and nearly round the calf of the leg. Much pain was experienced. Poultices reduced the one and allayed the other.

As far as the simple chemical action is concerned in these cases, it will be the same as that already described: the chloride of zinc destroyed the vitality of the parts with which it came in contact, but the comparative absence of pain that accompanied the process is due, perhaps, not only to its being developed slowly, but to its operation in a *nascent* condition. Beneath the silver plate the stimulating action is observable both in the healing that has taken place, and in the determination of blood to the part, as evinced by the sanguineous state of the discharge; and that an electric current applied to a cutaneous surface gives rise to a blush or even a rash, in proportion to its intensity, is a familiar fact. A galvanometer was employed in order to determine the intensity of the current, as well as to indicate that all was right without the removal of the dressings; but if one electrode be placed upon and one beneath the tongue, the passage of a current as well as its intensity, to some degree, can be determined by the sour taste developed at the positive pole.

In Cases 1 and 3 no current was obtained on the third

and fourth days, owing to the formation of an eschar; for on removing the zinc to a freshly blistered surface a current was at once established. This fact puts a limit to the time during which the same plates may remain unchanged; but in the method I have since adopted, no eschar at all is formed.

The first case especially notices the condition of the sore beneath the zinc plate; but the beneficial influence of the silver one was more carefully investigated soon after by Mr. Bransby Cooper, and it is stated, "with various results, but on the whole satisfactory. The cases in which it seemed to produce an extraordinary effect were those of tertiary sores; one of these cases had previously resisted all kinds of treatment." The same surgeon also made use of the zinc plate as an escharotic in a case of scirrhus cancer of the breast, and after the slough had separated he substituted the negative (silver) plate, and cicatrisation at once commenced at some points, while "the great tenderness was much relieved."

The plates had also been employed on the Continent about or prior to 1848; and in America by Dr. Harris; and in the 'London Medical Gazette' for 1848, Mr. Spencer Wells, then of the Royal Navy, gave the results arrived at by Dr. Cogevina, surgeon to the Civil Hospital at Corfu. Subsequently, in a communication on the subject to Dr. Golding Bird, he criticised these results from his own experience; and as, with one or two exceptions, the few cases I have myself treated led me to the same opinions, I will abstract his remarks upon the value of the plates.

1. The plates must be in perfect contact with the skin; but denudation of the cuticle is not necessary; moistening the part with vinegar and water does as well. In Case 2 I did not succeed by using hot salt and water; in every other case I first blistered.

2. Experience shows that if the plates be placed one above the other, the zinc (positive) must be superior. This is Dr. Cogevina's opinion; Mr. Spencer Wells has not verified it. In the cases given here the zinc in all was placed above, *i.e.* the current ran *down* the limb; but I think that this is not

necessary, as Case 3 shows, and as I shall more particularly point out farther on.

3. An eschar forms under the zinc in forty-eight hours ; in a few days it extends into the subcutaneous tissue. To avoid this, move the plate every other day to a new surface.

4. "When an ulcer presents an indolent or lardaceous base, this unhealthy base is destroyed, and the surface becomes a healthy granulating one after three days' application upon it of the zinc plate. After the slough has separated, an excavation is left and the granulations are healthy. They will reach the surface level with any simple application, but they do so much more rapidly when the silver plate of the apparatus is employed. That its good effect is not due to mere pressure of the metallic plates I have become convinced, after comparative trials of the application of the silver with and without connection with zinc." These are Mr. Spencer Wells' own words, and they express exactly what I have myself observed. With regard to the rapidity with which healing is induced, he adds: "I have often been astonished at the change effected in twenty-four hours in the condition of ulcers. At one dressing they are seen to be deep, cup-like excavations ; at the next the granulations have nearly reached the surface ; and after another day the surface level of the skin and granulations is uniform, the well-known marginal blue rim announcing the commencement of cicatrisation." After this stage simple water dressing is recommended.

5. The zinc plate may be employed as a caustic to destroy exuberant granulations, &c. ; "but the pain is much greater than when ordinary caustics are used." This last fact mentioned by Mr. Spencer Wells I have not observed in my cases ; and the comparative absence of pain which accompanies the process of disintegration seems, as before stated, to be due not only to the slow action of the chloride of zinc, because developed gradually, but to its operation in a *nascent* condition ; or, as Dr. Althaus expresses it, "because the caustic acts in infinitely small portions upon the skin, in proportion as it is liberated."

6. "If the silver plate is applied to a surface simply denuded of cuticle, or even to a freely suppurating one, it is rapidly dried and covered with a dense pellicle."

7. "Where several ulcers exist upon a limb, and the zinc is applied to a superior and the silver to an inferior one, or to denuded surfaces, all the ulcers situated in a direct line between the two plates improve in appearance, become healthy sores, and cicatrise, while those on either side of the current remain unaltered, and sometimes degenerate." Mr. Spencer Wells verified this deduction from Dr. Cogevina's experiments in two cases of his own. I have not observed it; but I should say that had the zinc and silver plates been transposed the results would have been equally satisfactory.

8. If the silver plate, in the form of a rod, is passed into a fistula for a few days, granulation and cicatrization rapidly follow.

The undoubtedly good results to which the above deductions testify, are in part neutralised by the inconvenience arising from the formation of a sore place by the zinc plate. The only way in which this can be avoided is by generating the electric current in a battery connected with the patient only by electrodes that are not easily destroyed by electrolytic action, or which, if destroyed, will not act injuriously upon the tissues of the body. In order, therefore, to obtain this end, as well as to reduce to a minimum the local chemical changes consequent upon the disintegration of the zinc plate, and to be able to observe the effect on repair of an electric current with only such chemical change as occurs during the electrolysis of the fluids of the body between the two surfaces operated upon, I employed a battery, the electrodes of which were alone applied to the raw surfaces.

Some observations were first made upon fresh muscular tissue at an average temperature of 65°. The pieces of flesh were placed between the several electrodes and kept moist either by a piece of lint dipped in water being wrapped round each, or by being enclosed in gutta percha.

The electro-motor used was one cell of the sulphuric acid battery, to be shortly described, for each experiment. The different metals employed were soldered to copper wire electrodes; for in using a battery of low intensity it makes a great difference whether the connections be soldered or simply twisted or clamped. If soldered, perfect "continuity

of tissue " is ensured, and if not, a perceptible amount of resistance is sure to be experienced.

Exp. E.—Flesh enclosed between a plate of zinc (positive electrode), and one of silver (negative electrode). On removal, the surface in contact with the silver was moist, rather gelatinous looking, harder than normal (a piece of muscle having been kept untouched for comparison), of usual colour, and strongly *alkaline* to test paper. The fresh muscle was also *alkaline*.

The surface in contact with the zinc was shrivelled, though moist, hard, white, fibrous looking, adhering firmly to the plate from which it had to be broken, and to which some remained fixed. The white colour and brittle hardness extended about one eighth of an inch into the substance of the muscle, but throughout it was, as stated above, harder than normal, and strongly *acid* to test paper.

Exp. F.—Flesh enclosed between two plates of silver foil. On removal of the positive electrode the surface was paler, softer, and more decomposed than under the silver plate in *Exp. E*; it was oozing and not gelatinous, but the piece of flesh as a whole was firmer than the piece kept for comparison. The surface was strongly *acid*. Beneath the negative electrode, the surface, which was rather adherent to the plate, was covered with extremely thin and papery flakes, whitish towards the flesh to which they were firmly fixed, and black towards the silver plate; very brittle and friable, and could only be removed by cutting off a piece of flesh with them. The plate itself was covered with opaque white patches as though daubed with white paint, which could not be detached. The surface was firmer than under the other electrode, and was strongly *alkaline*.

The piece of flesh kept for comparison, and under the same conditions as regards moisture and temperature, was rather softer and moister than when fresh, smelt strongly, and was *alkaline*.

The white paint-like patches beneath the negative electrode were probably pure silver deposited by the current, having exactly the same opaque creamy appearance that electroplated articles have when first removed from the bath. As the result of these experiments, I finally adopted silver

electrodes, and though the negative electrode from time to time required renewal, none of the inconveniences attended its disintegration which were seen where zinc was employed. The destruction of the silver electrode possibly is owing to the action upon it in a nascent state of the sodium, which is first set free beneath it, and immediately after converted into its oxide, or soda.

The greatest difficulty lay in the construction of a portable constant battery ; for while, as long as the patient kept his bed, a battery at the bed-side could well be used ; if he came to move about, either the treatment must be stopped, or a battery that he could carry about with him adopted. In two of the cases to be reported a portable cell was used, but the comparatively short time during which its action continued, and the constant changing required, soon led to its being given up. This battery (a 'Smee') consisted of a slip of thin zinc 2 inches by 1 inch, amalgamated with mercury, with a copper wire soldered to one end, and a piece of silver foil rather shorter but of nearly twice the breadth, also with a wire, folded so as to clasp the zinc like the cover of a book, the two metals being separated from one another by a layer of lint dipped in salt and water ; lint moistened in the same way was also wrapped outside, the whole being dropped into a cell of gutta-percha tissue, which was afterwards hermetically sealed at the top, and at the points from which the electrodes issued.

The battery used in Case 7 was of the same size and material as the last, but the two metals were isolated by a slip of gutta percha placed between them instead of moistened lint. It was excited by a very dilute solution of sulphuric acid, placed in an open cell of ordinary sheet gutta percha (as used for splints) of about one ounce capacity. The advantage of this form of cell over the other is great. The current developed is more intense, the internal resistance is reduced to a minimum, it continues longer in action, and when necessary the plates can be much more easily cleaned. A rough estimation of the intensity of the current can be gathered from the fact that three cells of the size stated will, in combination, decompose water and work effectually a galvanic coil of the size ordinarily used in the

wards. Such a combination is, however, too strong for therapeutic purposes, for it both gives rise to a severe burning pain, and rapidly destroys the negative electrode; usually one cell is sufficient.

CASE 5.—H. S—, æt. 6, was admitted under Mr. Bryant, in January, 1873, with a burnt arm. On July 3rd, the sore on the arm was as follows:—Irregular, with pale large granulations, raised above level of surrounding skin, with pus lying in the interstices between them; scarcely any attempt at skinning. It occupied the front and outer part of the left arm and forearm, extending for three inches both above and below the elbow. In this condition the ulcer had been for some weeks, closing very slowly indeed, and always presenting the unhealthy flabby surface described; various dressings had been applied, and the arm was straightened on a splint. The child appeared well in health, and was up and about the ward every day.

July 3rd, *morning*.—Blister, size of sixpence, formed on left shoulder. *Evening*.—One electrode of silver foil was placed on the blistered surface, the cuticle being removed; and the other over the lower half of the ulcer, and covered with a wet compress of lint and gutta percha, the whole being firmly strapped down.

Each electrode was connected by copper wire to the portable battery already described, which was excited by salt and water, and enclosed in gutta-percha tissue, and fastened to the splint on which the patient's arm was extended. The positive electrode passed to the blistered (upper) surface, the negative one to the ulcer. Though but one cell was employed, a distinct shock was felt every time that the circuit was closed and opened. The arm, plates, splint, and all were enveloped by a bandage in order that the patient might go about as usual, care being taken to protect the wires which appeared externally from injury, and to keep them insulated.

5th.—Dressing removed for the first time. The part of the ulcer covered by the negative electrode was level with the surrounding surface; clean, with red, healthy granulations, new skin appearing at the circumference for nearly the

depth of a quarter of an inch. The upper part of the ulcer, where simply wet lint had been applied, presented the same appearance as on the 3rd inst. The blistered surface was rather drier, otherwise it was unaltered. The battery, though in constant use for forty-eight hours, deflected the galvanometer needle 30° . Water dressing only was used the next three days.

8th.—The blister having healed, the positive electrode was now applied to the upper part of the ulcer, the negative to the lower, care being taken that the two did not come in contact. The mode of application was the same as before; two cells were, however, made use of. At first three were put in action, but the shock and muscular spasm, as well as the intolerable burning pain to which they gave rise when the circuit was broken, required one of them to be removed. That part of the ulcer that had already been treated was still clean and healthy, but the granulations were becoming rather flabby and pale, while the upper part remained in the same state as at first.

10th.—Dressing removed. The ulcer presented the same healthy appearance as after the first application, and both parts were seen skinning. There was one point of difference, however, in the fact that the surface beneath the positive electrode was redder, more vascular, and bled more easily when touched than that beneath the negative, though the latter had had the advantage of a previous application of the positive electrode. Water dressing.

12th.—Plates reapplied as before. Both parts of the ulcer retained their healthy aspect; but the upper portion now, both in colour and vascularity, was undistinguishable from the lower. On the latter portion two pieces of skin were transplanted, and were covered with the negative electrode.

14th.—Dressed again. The ulcer was skinning all round, and its surface still very healthy. Both pieces of skin had taken, and were double their original size. Plates reapplied, with this difference, that the positive electrode under which the greater stimulating action had been observed was put over the grafts on the lower half of the sore; the negative on the upper half, and so their relative positions hitherto maintained the same, were changed.

17th.—Lower half, the type of a clean, healthy, healing granulating ulcer; both grafts alive and growing; upper half also healing, but rather less active in appearance. Electrolytic treatment discontinued: cold water dressing applied. The ulcer, as was expected, did not maintain the same degree of healthy action to which it had attained; but though relapsing somewhat, it never again returned to its originally indolent condition.

Transplantation had been resorted to before, but never a graft had taken; so suitable a soil does not seem to have been obtained before. This patient left the hospital in September, one small place alone remaining open.

CASE 6.—A. R—, æt. 18, admitted into Charity Ward under Mr. Cooper Forster, May, 1873.

This girl, the report describes as pale and unhealthy looking, and as having, at the time of admission, on the outer side of the left leg, six inches above the ankle, "a sore with a good deal of discharge; bleeds a good deal, looks very unhealthy and angry, and the surface raw." She also has albuminuria.

July 18th.—The ulcer was as follows:—Skinning at the edges; the whole surface was flat and even, level with the surrounding skin, red and raw, but not bleeding, rather tender, and covered in part with small florid granulations, and marked with ramifying venules.

This case was treated as Case 5, the negative electrode being applied to the ulcer, and the positive to a blistered surface formed in front of the ankle. Two cells of the battery were strapped to the leg below the knee; the patient kept her bed, as she had done for a long time past. There were no enlarged veins on the legs, nor was there any cause known, other than a constitutional one, for the ulcer. The patient described it as first commencing as a "pimple." It had been variously treated, while tonics throughout had been administered.

From the 18th to the 21st of July the plates were used, but at the end of that time, no change whatever being observed, they were discontinued. Beneath the positive electrode a small circumscribed eschar formed, owing to a

fragment of zinc having adhered to the silver plate. An ulcer resulted, but it soon healed.

In October the patient was still in *statu quo*.

The result here observed might almost have been anticipated; a sedative and not a stimulating application being the one that the appearance of the sore more naturally suggested.

CASE 7.—A. K—, æt. 17, was admitted into Charity Ward under Mr. Cooper Forster, May, 1873, for ulcers on both arms, the result of a burn seven months before.

Up to August, when I first saw her, the patient had kept her bed, and had had various applications to the ulcers, which had also been transplanted from time to time: they had also been dressed antiseptically. Though not absolutely unhealthy, they were yet healing but slowly, and so the electrolytic treatment was tried to give the patient a chance of a more rapid recovery.

The plan adopted differed from that employed in the last two cases. The state of this patient compelling her to remain in bed, I made use of the sulphuric acid battery before described, which was fastened to the head of the bed. Three gutta-percha cells were fastened together and kept charged with dilute acid, so that each or every other day the plates could be lifted from one to the other without disconnecting the wires.

The electrodes of insulated copper wire passed from the battery to the patient, lying on or beneath the pillow according to circumstances, while they were sufficiently long to allow of any chance movement, without a strain being put upon them. The pieces of silver foil attached to them were fastened upon the ulcers, as in Case 5, by means of strapping and a compress of lint. To avoid repetition it may be here stated, that while as a rule only one battery was employed, yet at times a second was put into circuit, the object always being to have such a current passing as should give a very decided shock on making contact, but without leaving a permanently sore sensation when the circuit was completed. Anything beyond this was not only painful to bear, and therefore unnecessary, but very speedily destroyed the negative silver electrode.

August 14th.—The ulcers were situated on both surfaces of the left arm. The two principal on the anterior surface were selected, viz. one, the size of half-a-crown, on the front of the arm just below the shoulder; the other near the elbow, and measuring $2\frac{1}{2}$ inches by $2\frac{1}{4}$. They were granulating uniformly, rather raised above the level of the skin, were skinning very slightly at the border, and discharged profusely.

12 noon.—Positive electrode applied to larger sore, the negative to the smaller one near the shoulder. Sharp shock felt on making contact.

4 p.m.—No shock felt by patient on breaking or making contact, though the current was tasted as passing freely by placing the tongue in circuit.

10 p.m.—Same observation made with same results. When another battery was introduced into the circuit a shock was felt.

15th, 11 a.m.—Dressings removed; ulcer under positive (lower) electrode has a distinct blue line all round, $\frac{1}{4}$ th inch in depth, of new skin; granulations flatter; discharge diminished. The negative electrode was reduced to an impalpable black powder all over the surface of the smaller ulcer. Before, however, removing this electrode the positive one was cleaned from the mucoid discharge that adhered to it, and was again replaced: one battery now gave a shock as on the first application. The electrodes were renewed, and reapplied as before.

9 p.m.—No shock felt on breaking circuit.

16th, 11 a.m.—On removal the negative plate was again found destroyed, presenting the black and white colours observed in one of the the experiments already reported.

The lower ulcer looked very healthy; about $\frac{1}{4}$ inch of new blue skin at circumference; granulations even and level. Upper sore smaller, the pulverised plate concealed most of its surface, and there was no evidence of new skin at its border, but a circular scab had formed: it appeared to be drying up. Redressed, and only one battery used.

17th, 1 p.m.—Negative electrode covered beneath with white paint-like patches, but not disintegrated. Surface of the sore *alkaline* in reaction. Beneath the positive electrode

the new skin had increased in depth, while the discharge there was markedly *acid*.

This mode of treatment was carried on till the 27th, on which day the smaller sore, which had scabbed at the circumference throughout rather than skinned, had all but closed. The lower ulcer was much less than at first, although the rapid rate of skinning, first mentioned, had not lately been kept up. As it seemed that the ulcer no longer required a stimulating application, simple zinc ointment dressing was used. No further diminution had been noticed in size for two or three days.

19th.—Seven pieces of skin transplanted beneath positive electrode: every graft lived, though some eventually disappeared under ordinary dressing, and the purulent discharge at the same time increased in quantity.

I lost sight of this patient from this time, but in the opinion of the dresser, Mr. Paley, the ulcers that had been treated healed at a quicker rate than the others on the same arm.

From a perusal of all the cases now given, it will be seen that whether the electric current be applied from an electromotor independent of the patient, or whether he bear part in its production, the result is the same, and that the action of the current is a stimulating one, determining blood to the part, as shown by the sanguineous discharge, and restoring, where ordinary means had failed, that degree of reparative force necessary to bring about cicatrization. In common, however, with all other stimulating dressings, the electrolytic process acts up to a certain point and no farther, and when once skinning has been set going healthily and the surface of the sore is looking well, the plates may be removed in the full anticipation that the sore will not again relapse into the same degree of indolence, but continue to close; while, if necessary, they can at any future time be reapplied.

By employing a battery and making use only of silver electrodes to the ulcer, the general principles enunciated in the conclusions already stated are in no way altered, but the detail of performance is rendered more simple, as no second

wound is caused, like that produced by the zinc plate in the first set of cases. If an escharotic effect is desired, it is only necessary to substitute a piece of zinc for the positive silver electrode; for regarding the electrolyte as formed simply of an alkaline chloride, the electro-negative element or chlorine will pass to the positive electrode; and this, if of zinc, will undergo solution, and the caustic chloride of zinc result. Where both electrodes are inert, as where silver is employed, the more active change is seen beneath the positive (Case 5); this is most probably owing to the constant presence of freshly developed acid beneath it, and not to any difference in quality between positive and negative electricities, which are only comparative terms.

The limit of time where the zinc and copper (or silver) plates alone were used was determined in part by the formation of the eschar; but though no eschar is found where silver electrodes are employed, yet the coating of mucus-like discharge that appears after a time beneath them, seems to act as a non-conductor of currents of low intensity.

The direction in which the electric current should flow seems to be of no consequence, the same beneficial results being obtained whether the positive was above the negative electrode or *vice versâ*. Case 7 sufficiently indicates this point. Nerve influence, which alone would be affected by the positions of the plates, has, I believe, far less to do with bringing about the changes described than the local electro-chemical action.

Fig. 1.



Fig. 2.



A CASE
OF
FRACTURE OF THE SKULL,
FOLLOWED BY
A COLLECTION OF CEREBRO-SPINAL FLUID
BENEATH THE SCALP.
RECOVERY.

By R. CLEMENT LUCAS, B.S.

(REPORTED BY MR. MILLER, REGISTRAR.)

EMMA C—, æt. 2 years and 6 months, was admitted into the Evelina Hospital for Sick Children, on the 4th of August, 1875.

It was stated that, three weeks before admission, the child had fallen from a window eighteen feet from the ground, and was found lying upon its left side in a state of insensibility. About half an hour after the accident, the child is said to have cried and vomited, but to have remained unconscious until the following morning. Since then she has not spoken, and, though conscious, has remained fretful and drowsy. About a week before admission the mother noticed a swelling on the left side of the child's head, situated a little above the ear, and this swelling has gradually increased in size up to the present time.

At the time of admission there were no local symptoms indicative of injury to the brain ; there was no paralysis, the

pupils were equal and active, and micturition normal. Vomiting had not occurred since the day after the accident; but the child lacked animation, was peevish and fretful, requiring much attention, and taking little or no notice of toys. On the left side of the head was a swelling about the size of a pullet's egg, occupying the temporal fossa, and extending from behind the ear forwards to within an inch of the margin of the orbit. If followed closely the temporal ridge above, and below bulged slightly over the zygoma and pressed down the ear, so that the upper part of the pinna was at right angles to the side of the head. A little behind was another swelling about the size of a walnut, which was connected with the large tumour in front by means of a narrow isthmus. There was distinct fluctuation in each tumour, and fluid could be pressed from the smaller swelling into the larger, and from the latter back again into the smaller. There was no pulsation, and manipulation of the tumours appeared to excite no discomfort. The child's temperature was normal, and its pulse regular. Mr. Lucas, having determined to explore the contents of the swellings by means of an aspirator, inserted the needle of the instrument into that portion of the larger swelling which was situated behind the ear, and drew off exactly two ounces of a thin, slightly turbid, opalescent fluid. This, which presented the general characters of cerebro-spinal fluid, was given to Dr. Stevenson to analyse, who furnished the following report as the result of his examination:

"The liquid was slightly turbid, and contained a few fibrinous flocculi suspended in it.

Specific gravity 1·0059.

Organic matter	.	.	.	.	.	.	·19
Common salt (sodium chloride)	.	.	.	.	.	.	·43
Other salts	.	.	.	.	.	.	·31
Water	.	.	.	.	.	.	99·07
							<hr/> 100·00

"The organic matter contained albumen, but was free from sugar."

After the withdrawal of the fluid, a deeply depressed

fracture could be very distinctly felt in the position indicated in the drawing. It commenced in an angular depression, which corresponded to the position of the smaller swelling, and ran forward just above the ear into the temporal region. The depression alluded to, occupied the position of the lateral fontanelle, and might be thought to be due to a deficiency in the ossification of the cranium at that spot; but as no similar depression was to be found on the opposite side of the head, and as the other fontanelles were all closed, it is not improbable that the Wormian bone which usually helps to close the opening had been driven in. An irregular depressed line connected this with another fossa situated about on a level with the upper and back part of the pinna. This latter fossa would correspond to the interval between the squamous and mastoid portions of the temporal bone. Above the ear the fracture divided into two branches, one of which with a very sharp irregular edge ascended to the temporal ridge, the other ran more horizontally forward a little above the level of the zygoma. It was remarkable how clearly the edges of bone could be felt after the fluid had been withdrawn, and the accompanying diagram (fig. 2) was constructed after careful examination of the line of fracture with the finger.

An ice-bag was applied to the head after the operation, which was performed in the middle of the day.

August 5th.—Since the operation the child has had no serious symptom. The temperature, pulse, and respiration have remained normal. Soon after the operation, however, the fluid began again to collect, and by seven o'clock in the evening of yesterday the swelling was almost as large as it was previous to the operation.

6th.—The child is very irritable, and does not like to be disturbed. Sleeps well. Temp. normal; pulse 120; resp. 28.

7th.—There is no change in the condition of the child.

9th.—The child has slight diarrhoea, and is not so irritable. The swelling has somewhat diminished. She sleeps well.

10th.—The patient is still fretful, and has slight tendency to diarrhoea. The swelling is slightly smaller.

20th.—There has been no change in the symptoms since the last report.

28th.—The fluid in the tumour has been slowly diminishing, and the fracture can be distinctly felt. It has been noticed that the amount of fluid present in the swelling varies at different times, being less when the child is quiet, and increasing when it cries. There are no signs of cerebral disturbance except irritability of temper.

September 1st.—Since the last report there has been no change. The child continues to take food well, and there are no cerebral symptoms.

8th.—The fluid in the tumour is gradually diminishing. The fracture can be distinctly made out. The child's general health seems good, but it possesses a most violent and irritable temper.

15th.—The tumour has all but disappeared. The child is to all appearance quite well, though the seat of fracture can be still distinctly felt.

October 6th.—The patient was to-day discharged from the hospital.

December 15th.—The child was brought this morning as an out-patient to see Mr. Lucas. The swelling, which had disappeared from the temple before the child left the hospital, has not again returned. There remains, however, just above the ear a small swelling, which contains about a drachm of fluid, and is situated immediately over a deep depression, the anterior and lower of the two figured in the diagram. This swelling increases in size, and becomes tense when the child cries. The posterior of the two depressions shown in the diagram can still be distinctly felt. The mother states that the child has not spoken since the accident, and remains peevish and fretful, requiring to be constantly nursed. It has never attempted to walk since the injury, although before it was continually running about. When it requires food it asks for it by putting out its hands. The child is well nourished, and intelligent in appearance.

Remarks.—This is one of those very rare cases in which, after fracture of the vault of the skull, cerebro-spinal fluid has escaped through the fissure in the bone; and I believe it is the only case on record of simple fracture of the skull,

giving rise to a tumour of cerebro-spinal fluid, followed by recovery.

Mr. Prescott Hewett, writing in 'Holmes's System of Surgery,'¹ refers to ten cases of compound fracture or trephining of the vault, in which cerebro-spinal fluid had been observed to escape through the wound. In seven of these cases the fluid was supposed to have escaped from the sub-arachnoid space, and in the remaining three from the lateral ventricle.

Of simple fractures of the skull, followed by the escape of cerebro-spinal fluid beneath the scalp, I am acquainted with only two recorded cases. One of these is mentioned by Erichsen;² and, except that it occurred in a hydrocephalic child, and resulted in death, bears a close resemblance to the case I have narrated. He relates the case in the following words: "A hydrocephalic child fell from the top of a house on to its head, and sustained a large fracture through the left side of the skull, but without any scalp-wound. Shortly after the accident, a large, soft, fluctuating tumour formed under the scalp opposite the line of fracture; and on this being tapped, about three ounces of hydrocephalic fluid was drawn off. This operation was repeated, but the child died about ten days after the injury, with hemiplegia of the opposite side, and convulsions." In my own case there was no hydrocephalus. The child was in all respects well formed, and the head of normal size.

The other case was reported by Mr. Warrington Haward.³ A male child, nineteen months old, fell from a skylight head foremost on to a wooden floor fifteen feet below. He was insensible for twenty minutes, and remained drowsy and inactive for twenty-four hours, after which time he regained his usual intelligence. The parents noticed that an hour after the injury a swelling appeared above the right orbit: it extended upwards some three inches, and gradually increased in size. After four or five days the palpebral conjunctiva became distended with fluid, and the eyelid everted. The tumour pulsated and was translucent. The child remained

¹ 1st ed., vol. ii, p. 138.

² 'Science and Art of Surgery,' 6th ed., vol. i, p. 423.

³ 'Lancet,' July 17th, 1869.

for six weeks without any cerebral symptoms, then lost appetite, ceased to walk, and became fretful. Two months after the accident Mr. Holt tapped the swelling and drew off eight ounces of cerebro-spinal fluid. The tumour rapidly reappeared, and the child remained in about the same state for eight days, when the conjunctiva gave way, and a large quantity of fluid escaped and continued to drain away. Frequent convulsive movements of the left side then occurred, followed by fever, coma, and death after three days.

At a *post-mortem* examination, a depressed fracture of the frontal bone above, and including the orbital arch, was discovered. The pericranium was detached to the extent occupied by the tumour during life, and the handle of a scalpel could be passed through the fracture into the substance of the brain.

In commenting upon this case, Mr. Haward suggests that, if the child had lived, the tumour would have been cut off from the cavity of the skull by the union of the fracture, and thus have been reduced to an innocuous cyst of the scalp. It does not appear, however, judging from my own case, that this is the course taken by Nature in attempting to effect a cure. The object of the effusion is, in all probability, to separate off and protect the brain from the angular and depressed edges of bone, till they may have become rounded off, or the brain have become less sensitive to irritation. After a time, when this may have been effected, the fluid, already probably become encysted on the inside of the skull, ceases to be secreted and undergoes absorption, so that the tumour on the outside gradually diminishes. But it would seem, that so long as a swelling remains beneath the scalp, there is still a communication with the interior of the skull. When I last saw my patient, five months after the accident, a little fluid, which increased in quantity when the child cried, could still be felt between the scalp and depressed bone.

What may be the ultimate result of this injury, whether the recovery will be complete, or whether the bodily functions having recovered, the mental may remain crippled and cease to develop, it is impossible at present to surmise. Possibly idiotcy may follow, or after a period of health epilepsy may

supervene. So long ago as 1828, Professor Dudley¹ published several cases in which a depressed fracture, occurring in early childhood, was followed at puberty by epilepsy. In these cases he trephined with good result. Hitherto there has been no symptom, in the case I have detailed, which would justify me in attempting to elevate the depressed bone. As to the advisability of interfering with a tumour of cerebro-spinal fluid at all, I think the experience of Erichsen's and Haward's cases must be admitted to be decidedly opposed to any operative procedure. By drawing off the fluid the patient is exposed to the risk of acute cerebro-meningitis from the contact of angular fragments of bone with the surface of the brain; and I think, except when it is uncertain whether the swelling contains pus or cerebro-spinal fluid, tapping should not be resorted to.

The absence of any local signs of inflammation, translucency, and a peculiar *thinness* in the sense of fluctuation, are signs by which a tumour containing cerebro-spinal fluid may be distinguished from one containing pus. Pulsation, and increase in the size of the swelling when the child cries, together with an absence of any elevation of temperature, would confirm the diagnosis.

¹ 'Amer. Journ. Med. Sc.,' vol. ii, p. 490.

NITRO-BENZOL POISONING.

By THOMAS STEVENSON, M.D.

MISTAKES in the reading of prescriptions are not rare, and are not infrequently caused by the careless writing of the prescriber. Marked cases of poisoning by nitro-benzol have not often been recorded in this country, though it is probable that a considerable number of persons may from time to time suffer from the minor effects of this deadly substance, either through inhaling its vapours, or from swallowing the substance itself in the form of artificial almond flavouring. The case I am about to record is, I believe, unique, nitro-benzol having been taken by an adult man in measured doses until the full physiological, and well nigh lethal, effects of the poison were produced. The symptoms were well marked, and the delayed, or cumulative effects of the liquid were very apparent.

I append the prescription, beautifully lithographed, through the misreading of which the case occurred; and also another prescription, written for the same patient by the same physician. They are both somewhat of curiosities in the way of illegibility. The first of these prescriptions is rather a favorite with the prescriber, and has frequently been misread; the true reading, "Benzole Rect.," being sometimes taken for "Bismuth Nitr."

Mr. Sydney S—, æt. 21, married, consulted a physician in November, 1875. He had previously been healthy, but

was then suffering from a pain in the chest, troublesome cough, and free expectoration. Strychnine was prescribed as a tonic, and subsequently the following mixture:

R. Benzole Rect. ʒij,
Ol. Menth. pip. ʒss,
Ol. Olive, ʒx.
gutt. xxx t. d. s.

He was requested to have the medicine dispensed by a particular druggist. This was done, and the cough was relieved.

In February, 1876, the patient had again occasion to take the medicine. The original prescription was taken to a large establishment, where it was misread, and nitro-benzol given instead of rectified benzol, the dispenser commenting on the dangerous nature of the medicament which he supposed had been ordered.

On February 21st Mr. S— took three doses, each of 30 drops (= 20 minims), on sugar; on February 22nd three doses, and on the next day one dose at 9 a.m. He thus took seven doses, or an aggregate of about 23 minims of nitro-benzol, the interval between the first and last doses being forty-eight hours.

On the afternoon of the 22nd he was observed to look a little pale and weak, but he was not conscious of feeling ill till after taking the final dose at 9 a.m. on the 23rd. All that morning he suffered from headache. At 1 p.m. he had his dinner, after which he went from the city to Islington, and back again to the city. His fellow clerks then said that he looked ill, and had better go home. He left the office shortly after 2 p.m., but had not walked more than forty yards when he fell down. He was just sensible enough to state where his office was situated, but speedily became quite unconscious. He was seen at 3.15 p.m. at his office by Mr. Gross, a student of Guy's Hospital, who at first thought that he was dead. The surface of the body was bluish-purple and cold, and the pulse could not be felt at the wrist. The heart could be heard beating faintly and irregularly. The lower jaw was rigidly closed, but the limbs were flaccid and dropped powerless when raised. The pupils were widely

dilated. No breathing could be perceived until twenty minutes after he was first seen by Mr. Gross.

The treatment consisted in the application of sinapisms to the chest, and abundant friction of the limbs for two hours. In an hour, when he had become partially conscious, the secondary current from a magneto-electric machine was sent through the hands and upper limbs. This appeared to excite the heart to more vigorous action, and also induced vomiting. The vomit smelt strongly of nitro-benzol, and consisted of the remains of an abundant meal. He passed a stool into his clothes.

Between 5 and 6 p.m. he was admitted into the hospital under Dr. Moxon. He was then nearly insensible; the pulse was very weak and irregular, and could not be counted. Brandy was administered, and ammonia inhaled. About 7 p.m. he began to be conscious, and could then remember all that occurred before 2 p.m., but nothing subsequently. He also complained of headache.

At 9 p.m. the skin was still very blue, and the headache persisted. Pulse very irregular. From this time he made a satisfactory recovery, and by the middle of next day was fairly convalescent.

Eight fluid ounces of the urine collected on the morning after the onset of violent symptoms, and after convalescence was well established, were agitated with chloroform, the chloroform well washed and evaporated. A residue was left from the evaporation of the chloroform which had a decided odour of nitro-benzol.

This is, so far as I am aware, the only case in which the probable fatal dose of nitro-benzol has been ascertained. It cannot be doubted that the quantity here administered would have proved fatal had not energetic means been employed to counteract its effects.

It will be noted how closely the symptoms approximated to those produced by prussic acid. Indeed, it was only when the patient was so far recovered as to be out of danger that the true nature of the case was ascertained. The remainder of the medicine in the bottle used by the patient was then brought to me, and was at once recognised by its odour as containing either oil of bitter almonds or nitro-benzol. The

odour was masked by peppermint. It is not always possible to discriminate between oil of bitter almonds and nitro-benzol by their odours. Finding no prussic acid in the medicine, I was about to test for nitro-benzol when the prescription was brought to me, and the nature of the substance taken was at once perceived. I myself, and several experienced pharmaceutical chemists to whom the prescription was shown, all agreed that nitro-benzol, "Benzole nitr." had been ordered; and it was only on inquiry at the shop where the prescriber, who is an M.R.C.P. Lond., has his prescriptions made up, and where this particular medicine had been originally dispensed, that it was ascertained that rectified benzol was the drug he intended to prescribe.

I am greatly indebted to Mr. Gross and to Mr. Champneys for their kindness in enabling me to report this interesting case.

the Beagle not 30
or much less 30
or more 30
from 40 to 40
+ all

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 Sun Vale f $\frac{1}{4}$
 e Ann f $\frac{1}{4}$
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 Myrmidum f $\frac{1}{4}$
 Deut Allen f $\frac{1}{4}$
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REMARKS
ON SOME OF THE
PAROXYSMAL NEUROSES.

By C. HILTON FAGGE, M.D.

Among the functional diseases of the nervous centres there is a remarkable group of which the different members, although they differ widely in their symptoms, nevertheless bear close mutual relations, and present many points of resemblance in their causes and in the circumstances under which they manifest themselves.

They all recur paroxysmally, at periods which are (at least in some cases) more or less regular. Many of the persons who are subject to them are in perfect health during the intervals between the seizures. We may distinguish these affections as "*Paroxysmal Neuroses*;" or, adopting the expression of Dr. Edward Liveing, as "*Nerve Storms*."

The chief among them are migraine, paroxysmal vertigo, epilepsy (including both the *petit mal* and the *haut mal*), catalepsy, somnambulism, and paroxysmal insanity. But with these several others should probably be included. I may mention tic douloureux, angina pectoris, gastralgia, spasmodic asthma, spasmodic croup, laryngismus stridulus, and tetany. No modern writer has so clearly pointed out the relations of these various diseases to one another as Dr. Liveing, who in

his treatise on Megrim or Sick Headache insists strongly on the fact that in the same patient they are often transformed, one into another, in the course of time. Most other observers have dealt with them from too narrow a standpoint; they seem to have aimed at including every metamorphic variety under some one single affection, such as epilepsy, rather than at giving a comprehensive view of the whole group.

Thus, in the present communication my chief object is to criticise some very recent views in regard to other paroxysmal neuroses, by the light of what appear to me the just conclusions of Dr. Liveing in reference to migraine. In attempting to do this I have necessarily had to trace out in some detail the causal relations of that disease: and I have laid Dr. Liveing's work freely under contribution, as would, indeed, have been apparent to every one familiar with it, even if I had less frequently cited him by name.

An important character of these diseases, at least of most of them, is that they are essentially innate and hereditary: but I forbear to dwell on this, because it is common to many other neuroses as well; and for the same reason I pass over the circumstance that in different members of the same family the inherited tendency may show itself in different ways—one child being epileptic, another asthmatic, a third subject to migraine, &c. Indeed, I by no means wish to represent the paroxysmal neuroses as a perfectly isolated group of affections, bearing no relation whatever to other nervous diseases. On the contrary, there are unmistakable evidences of such a relation; as, for instance, between epilepsy on the one hand, and chorea and hysteria on the other hand. But I am strongly of opinion that by studying migraine, vertigo, and epilepsy together, one is led to more just conclusions about them than by viewing them as altogether independent affections, or, on the other hand, as mere members of the large class of neuroses in general.

Thus, in more than one of the affections now to be described each attack is made up of a regular succession of phenomena. In migraine it often begins with a peculiar affection of sight; afterwards there are numbness of the fingers, vertigo, headache, vomiting, and sleep. In epilepsy there is perhaps sensation passing up from one of the limbs to the head,

and then successively a very complete insensibility, a general tonic spasm, a series of clonic convulsions, and a prolonged stupor. We can hardly fail to regard such seizures as dependent upon the gradual extension of a morbid change from one part to another of the nervous centres; and it seems highly improbable that any part of them should essentially depend upon a mere alteration in the cerebral blood supply, as has been supposed by many writers.

Another point in which most of these affections agree is that the attacks gradually culminate to a certain pitch of intensity and then subside; and yet another is that there is a kind of compensation in regard to the frequency and severity of the paroxysms, a slight one having one to follow it at an unusually short interval, and *vice versa*.

The seizures themselves are often directly traceable to causes which are very similar for different members of this group. In describing the different varieties of nerve-storm one has again and again to mention gastric or hepatic disorder, irritation of the brain from dentition or disease of the teeth, exhaustion from deficient food or excessive bodily exercise, affections of the sight, smell, or hearing, as giving rise to a first attack, or even to the succeeding ones. Many of these neuroses bear a relation to puberty and the other great epochs of life, as well as in women to the occurrence of the catamenia and to pregnancy and the puerperal state. Most of them are apt to break out for the first time at some particular age; migraine and epilepsy at or about puberty, laryngismus stridulus and spasmodic croup in early childhood, tetany in childhood (except when it occurs in puerperal women), &c. Some of them tend to disappear spontaneously when a certain period of life is reached; thus, migraine often ceases to recur after about the age of fifty.

As I have already remarked, a feature which is common to the paroxysmal neuroses is their tendency in the same patient to undergo metamorphosis in course of time. This is particularly the case with epilepsy; its attacks are liable to be replaced by vertigo, catalepsy, mania, or even other forms of nervous disturbance. Indeed, if we had convenient English names for the *petit mal* and the *haut mal*, it would be well that they should be described separately, for their relation to one

another is not very much more close than to some of the other affections which I regard as distinct. The connection between migraine and epilepsy is certainly much less intimate; but I shall hereafter mention some cases which have been regarded as proofs that they are to some extent related to each other.

Migraine.

I do not attempt to describe over again the phenomena of the paroxysm of migraine, which have been so fully detailed by Dr. Living. But with regard to the relation between the hemiopia and the headache, I think it permissible to express a doubt whether he and other writers are right in supposing that the latter may begin without having been preceded by the former, or at least whether such an occurrence is not far more rare than has hitherto been supposed. A very curious circumstance in regard to the visual affection is that some of the best and most careful descriptions of it have been written, not by medical men, but by astronomers and philosophers. Wollaston, Arago, Sir David Brewster, Sir J. Herschel, Sir C. Wheatstone, Sir George Airy, and Professor Dufour, of Lausanne, may be mentioned as having been liable to this paroxysmal defect of sight, and as having carefully noted its phenomena; and I do not know any other malady which, within the present century, has been the subject of two papers admitted into the 'Philosophical Transactions,' as well as of communications to the 'Philosophical Magazine' and other scientific publications in this country and abroad. It may be a question whether persons who are not accustomed to employ the eyes for minute observation would notice the dimness of sight, or regard it as of sufficient importance to be mentioned to a medical man. Indeed, when it commences at some distance from the centre of vision, I believe it is sure to be overlooked, unless the patient's attention is specially directed to its occurrence. And this may, perhaps, be the reason why Professor Du Bois Reymond does not mention it in describing this form of headache as occurring to himself.

The anatomical seat of migraine was long ago pointed out by Wollaston, who observed that the hemiopia which he described would probably be found to arise in the optic thalamus of one

side. And, as Dr. Liveing says, the only correction that this statement seems to require at the present time consists in the inclusion, within the area of disturbance, of the ganglia of the sensory nerves, down to the nucleus of the vagus. The order in which the symptoms follow one another in the several attacks renders it likely that the affection generally starts in the thalamus, and passes downwards and backwards along the sensory tract. The numbness and tingling in the fingers or other parts are, perhaps, due merely to disturbance in the thalamus itself. But when disorder of speech and impairment of memory are present, one can hardly doubt that the change must have spread upwards towards the convolutions. That it may also extend to the opposite side of the brain, along some of the commissural fibres, appears to follow from the facts that the numbness in the tongue and throat is sometimes bilateral, and that the headache very frequently is so.

As to the exact nature of the change in the sensory tract which gives rise to migraine, I do not think that anything definite can at present be stated. The most recent hypotheses refer it to vaso-motor disturbance. Thus the theory of Dr. Latham (1872) is that in the early stage the affected side of the brain is anæmic; that the contraction of the blood-vessels of this hemisphere is itself due to a morbid activity of the sympathetic nerve; and that this in its turn results from a defective control or inhibition on the part of the cerebro-spinal system, which he supposes to be enfeebled. In the stage of headache he supposes that there is a secondary hyperæmia, consequent upon exhaustion of the vaso-motor apparatus. Du Bois Reymond had previously (1860) maintained that, at least in his own case, migrainous headache was due to a tetanus of the muscular coats of the vessels of the affected side, in the territory of the cervical portion of the sympathetic. On the other hand, Möllendorff (1867) and Dr. Wilks (1869) endeavoured to prove that the complaint is caused by a paralysis of the very same nerves, with dilatation of the vessels and consequent hyperæmia. The former writer lays great stress on the fact (which had been pointed out nearly a century ago by Dr. Parry, of Bath), that compression of the carotid on the affected side of the head often removes the headache as if by magic, but only temporarily.

But I think it is clear that diminishing the blood supply to one side of the brain may very well suspend for a time the disturbance in it which is felt as pain, and yet that that disturbance need by no means have been caused by an overflow of blood. And, as Dr. Liveing points out, the statements of different observers with regard to the condition of the pupil are so diametrically opposed that no other inference seems possible, but that it must really differ in different cases. While as for the dilatation of the temporal artery, the flushing of the face, the redness of the conjunctiva, the injection of the fundus of the eye, there is direct evidence that each of them is only occasionally, and not constantly present. The only possible conclusion seems therefore to be that all these vaso-motor phenomena are accidental rather than essential characters. As Dr. Liveing remarks, there is a clear analogy between the paroxysmal neuroses, and certain minor consensual and automatic movements (such as those of sneezing, coughing, and gaping), and some of those which serve for the gratification of the natural appetites and passions; yet no physiologist thinks of referring any of these to vaso-motor disorder.

Thus it would seem that at present we can form no clearer conception of an attack of migraine than that it is a "*nerve storm*," the result of an irregular accumulation and explosive discharge of nervous influence.

In some persons the attacks of migraine recur with great regularity. The period is sometimes a fortnight, sometimes a month, sometimes longer still. There are, however, cases in which it is much shorter. We shall presently see that the immediate exciting cause of the paroxysm is very often excessive fatigue from brain-work. The constant repetition of this may render the attacks correspondingly frequent. I remember the case of a bank clerk, who for a considerable time had an attack regularly every week day, but was free on Sundays. And some years ago a governess was under my care who had a headache every night. In cases of this kind some of the more characteristic features of the complaint are very apt to be missing; but I believe that their relation to true migraine can often be established by the account which the patient gives of his previous state of health. Further

observation may perhaps show that a headache which is persistent, and lasts for a great length of time, may grow out of the paroxysmal affection. Such a case would be strictly parallel to one of epilepsy, in which the so called status epilepticus is developed.

In the cases just referred to the complaint may return every day, or every other day, as regularly as the paroxysms of an intermittent fever; and this fact, together with the striking therapeutical influence of quinine, often makes it difficult to exclude the possibility of miasmatic poisoning. But, on the other hand, these circumstances, taken by themselves, are far from justifying the conclusion that a migraine is really due to such a cause, and deserves the name of brow ague. I do not myself believe that in persons living in London this origin of the complaint can ever be established satisfactorily; and it is probable that even in districts where marsh miasm prevails, cases of simple migraine and of other forms of neuralgia are often wrongly ascribed to it, just as I believe the same thing to have happened in the case of intermittent hæmaturia. But it appears to be certain that it is sometimes really the cause; and in some parts of Spain a miasmatic migraine is said to be endemic. Again, Dr. Macculloch has stated that this kind of headache may occur as a substitute for ague during the whole of one relapse of the disease, and that he has seen a "double tertian" ague, in which the headache and the ague fit occurred regularly on alternate days.

In England, however, it is universally believed that migraine, instead of being essentially a nervous malady, is the result of "bilious" disorder. And, when the attack is accompanied by vomiting, this is supposed to expel a *materies morbi*, in the shape of vitiated bile. Until one has happened to discuss the matter with some non-medical friend or patient of average intelligence and education, one can hardly conceive how firmly fixed the belief in question is in the mind of every one who has not been taught the contrary. A notion of this kind could only be derived from the medical science of a former age; but one might well wonder how the teachings of a previous generation of physicians should have left behind them so absolute a conviction. The truth, however, is that it is a relic of one of the most ancient doctrines in the history

of the healing art,—that of the four Cardinal Humours, one of which was “yellow,” and another “black” bile. There is not, therefore, any ground for surprise at the difficulty with which it is eradicated from the popular mind.

But although it is certain that migraine is never solely due to disorder of the chylopoietic viscera, there is yet no question that some error of diet is often the direct exciting cause of an attack in a person who is liable to it. I am not now referring to the diffused headache and giddiness which are apt to be more or less constantly present in persons who suffer from dyspepsia or from the so-called congestion of the liver, and which have doubtless been often confounded with true migraine. What is conclusive as to the reality of the influence of improper food is the fact that some persons at least can always bring on an attack by eating particular articles of diet towards the end of the interval between one headache and another; whereas, for a few days after a paroxysm, they might partake freely of the very same things without suffering in any way. Dr. Fothergill nearly a century ago stated that he had found nothing more apt to cause “sick headache” than “melted butter, fat meats, spices, meat pies, hot buttered toast, and malt liquors when strong and hoppy.” A medical man who had suffered all his life from the complaint told Dr. Liveing that he could never take the smallest quantity of wine nor eat the smallest fragment of burnt pastry without bringing on a headache. Many persons speak of butter and pork as particularly frequent exciting causes of migraine; and, making every allowance for the influence of preconceived opinions, I do not think that the validity of such statements can be entirely impugned.

In women, again, the recurrence of the catamenia is often an exciting cause of attacks of migraine, which, perhaps, generally precede the flux, but sometimes accompany or even follow it. Not unfrequently each monthly period brings with it a series of more or less distinct paroxysms of headache. A striking illustration of this connection is afforded by a case related by Dr. Liveing, of a woman who was very liable to the complaint when menstruating, but who throughout repeated pregnancies was always entirely free from it. This writer also mentions an instance in which the headache and the

catamenial discharge recurred simultaneously at fortnightly intervals.

But fatigue is a far more important exciting cause of migraine than either of those which I have mentioned. In some persons a straining effort, such as lifting a heavy weight, will bring it on; and in others the exertion of running is apt to have the same effect. Many patients are exceedingly liable to be attacked by it after protracted labour, such as a hard day's washing; or after prolonged exercise, particularly if the stomach be not duly supplied with food. Another frequent cause is severe mental work; but, above all, anxiety and worry. A long railway journey is apt to be followed by a paroxysm in some individuals, and in others merely driving in the streets of London has the same effect. Many persons always have a sick headache after a day's sight-seeing, or after passing an evening in a crowded concert-room or ball-room; and in some susceptible individuals an attack may be brought on by glaring lights, loud noises, or the strong odours of certain flowers. Dr. Airy mentions the case of a person in whom the peculiar affection of sight was occasionally caused by looking at a striped wall-paper or a striped dress; and Sir J. Herschel states that he had it as the result of allowing his mind to dwell upon a description of the affection.

In several of the conditions already alluded to as exciting causes of migraine, one element is exhaustion of the visual apparatus. This is true, for instance, not only of over-study, but also of railway travelling and the like. And, many years ago, M. Piorry propounded the theory that the complaint, or, at least, one variety of it, was the result of irritation of the optic nerves, from straining efforts to see very small objects, or from want of care in regulating the amount of light. Now this view is altogether untenable, if applied to all cases of migraine, or even if limited to that form of it in which symptoms referable to the visual apparatus preponderate, the headache being slight. But it is perfectly true that when the eyes are structurally imperfect the forced use of them may be the immediate cause of attacks of migraine. The defects which lead to this result are chiefly those of the transparent or refracting media of the eyes; their direct effect is the production of spasm of

the ciliary muscles, and with this is associated an irritation of nervous filaments, which may diffuse itself over a wide area within the distribution of the fifth nerve. Every practitioner now knows that hypermetropia is a frequent cause of attacks of dimness of sight, headache, and giddiness, which recur when the eyes are used for near work for any length of time, particularly under artificial light. A student lately consulted me for similar symptoms, and it was not for some little time that I discovered that they were the result of the employment of too powerful concave glasses, which he had chosen without proper advice in order to correct a moderate degree of myopia, and which he wore even when reading or writing. In this connection, too, astigmatism must not be overlooked. Another cause of such symptoms is weakness of the internal recti muscles. Three years ago I had a bank clerk sent to me who had previously more than once had to give up work for a period of two or three months on account of cerebral symptoms. These had been thought to be of a serious character; but I had him examined by my colleague, Mr. Higgens,¹ and he discovered that the internal recti muscles failed to make the eyes converge properly upon near objects; when suitable glasses were supplied to him he soon lost all his complaints. In practice, therefore, one should make it a rule never to prescribe for any kind of frontal headache without eliminating the possibility of its being caused by imperfection of the organs of sight.

In its typical form migraine presents little or no difficulty of diagnosis. I have seen one or two cases in which a syphilitic periostitis of the margin of the orbit has produced recurrent pains of somewhat similar character; but this could not escape the notice of any but a very careless observer.

When the phenomena of the attacks are ill-developed, however, one may not find it easy to determine whether they belong to the disease now under consideration, or to some other neurosis. I have more than once been disposed to think that migraine and the *petit mal* of epilepsy are really linked together by transitional forms. Another form of

¹ This is the case related by Mr. Higgens in the last volume of these 'Reports,' at p. 124. I may say that I was not one of the three medical men whom he mentions as having thought the case was one of cerebral disease.

migraine about which one may fall into error is that in which an affection of speech is a main symptom. Some months before his death the late Dr. Phillips had a severe attack of headache, attended with marked aphasia. When he had recovered I one day happened to discuss with him the question whether it could have been of the nature of migraine; but his fatal attack of apoplexy, which doubtless was the result of embolism, afterwards began in precisely the same way, and presented the very same symptoms. It seems to me very doubtful whether Dr. Liveing is right in regarding as a mere paroxysmal neurosis a case of Dr. Steel's, in which attacks of loss of speech and right hemiplegia recurred, persisting for a week or more at a time.

Migraine is so common a complaint that one can hardly attach very much importance to the mere fact that some other neurosis occasionally develops itself in those who are subject to it, as indicating that there is any real relation between them. Dr. Liveing, however, believes that a transformation sometimes occurs between migraine and epilepsy; and he relates cases in which persons who had suffered from the former afterwards became affected with the latter disease; but it is to be noted that some of them had relations who had been epileptics. This writer also refers to an instance in which migraine became replaced after a certain period by asthma; and to another in which a constantly recurring gastralgia disappeared and was followed by a typical migraine, while this in its turn was succeeded by a kind of spasmodic croup. He also relates a case in which attacks of sick headache were followed after a time by angina pectoris; and another in which insanity developed itself.

I do not think that any medical man can have suffered again and again from migraine without having the thought forced upon him that such attacks must indicate a defect of cerebral organization which might subsequently result in serious mischief. And Dr. Liveing quotes M. Calmeil as having remarked that both the intellectual faculties and the moral disposition of the patient are sometimes impaired by the repeated occurrence of migraine. He also refers to the cases of Parry and Wollaston, both of whom, after having long been subject to this complaint, died of organic cerebral

disease. But such results are in the highest degree rare and exceptional.

Striking examples have been recorded by Abercrombie and Lebert in which paroxysms of migraine were excited by organic disease of the brain. The former writer relates the case of a boy, æt. 6, who began to suffer from fits of severe sick headache, recurring at first about once a fortnight, and leaving him in good health in the intervals. After five or six months the cerebral symptoms assumed a different and more persistent character; and two months later he died, when a tuberculous mass was found in the cerebellum. I hope presently to show that such instances have an important bearing on the theory of epilepsy.

Paroxysmal Vertigo.

Another affection which may occur paroxysmally is vertigo or giddiness. The expression "paroxysmal vertigo," indeed, is not altogether free from ambiguity; for the analogous one, "epileptic vertigo," is commonly used as a synonym for that less severe form of epilepsy which is also known as the *petit mal*. The latter, however, is not always, nor even usually, attended with any giddiness, and it is distinct from the complaint of which I am now speaking. Two forms of this are recognised by systematic writers. In one the patient feels as though he himself were made to turn round and round, or were against his will impelled forwards, or backwards, or to one side. In the other he fancies that objects are revolving round him. In either case he remains perfectly conscious, and all that occurs is duly registered in his memory. If the same thing should have happened to him before, he may be perfectly well aware that his sensations are devoid of foundation; yet by the strongest effort of his will he may be incapable of freeing himself from them. But in a first attack he may be completely deceived. I was told by a patient, who happened to be a railway official, that on a particular occasion, when he was travelling, one side of the carriage suddenly seemed to rise four or five feet, and to throw him into the opposite corner. Having never experi-

enced a similar sensation, he was under the belief that there was a serious accident ; but in reality he had not moved from his seat. Dr. Ramskill relates that a patient of his, who was attacked while in the street, felt the pavement uneven, with alternate depressions and elevations over which he seemed to be obliged to lift his feet. At the same time the shopwindows seemed to him to be moving forwards, and the passers by to be racing after one another. He also felt giddy in himself ; and as a matter of fact the two forms of vertigo to which I have above referred cannot be regarded as distinct affections. In most cases both of them are experienced, either at the same time or in succession. The gait is unsteady or reeling ; the patient feels afraid of running against other people or surrounding objects ; he catches hold of some support ; he may even lose his balance and fall to the ground. Sometimes the act of closing the eyes removes the sensation of vertigo completely for the time. Nausea very commonly accompanies the attacks, and even vomiting.

Paroxysmal vertigo is often connected with impairment of the sense of hearing, the patient being more or less completely deaf on one or both sides, and generally experiencing sensations of buzzing or singing in the ears. In 1861, Ménière recorded in the '*Gazette Médicale*' some remarkable instances of this kind ; and of late much attention has been drawn to such cases under the name of Ménière's disease ; but I am not myself prepared to accept the prevalent interpretation of their pathology.

In the first place, it is certain that affections of the middle, and even of the external, ear may give rise to attacks of giddiness, faintness, sickness, &c. For example, in the '*Archives of Ophthalmology and Otology*' for 1871, both Knapp, of New York, and Bremner, of Zürich, mention cases of aural catarrh, in which such symptoms showed themselves ; and Toynbee many years ago asserted that cerumen accumulated in the external meatus might by its pressure on the membrana tympani produce similar effects.

But in the great majority of cases all the more accessible parts of the organs of hearing are free from disease. Generally speaking, if the deafness is of one ear, a tuning fork is not heard on that side, even when placed upon the teeth or

upon the top of the head. It is inferred that the seat of mischief must be the internal ear.

At this point some very interesting physiological observations appear to find their application. Many years ago Flourens discovered that in pigeons and rabbits section of the semicircular canals causes strange disturbances of equilibrium. And recently Crum Brown and others have shown good reasons for the belief that the function of these structures is to furnish the impressions which form the principal basis of our knowledge as to the relation between our movements and those of surrounding objects. They have even shown what are the several disturbances of equilibrium which irritation or destruction of each canal may be expected to produce. And accordingly it has been proposed to employ the name "labyrinthine vertigo" as synonymous with Ménière's disease. Charcot observed a case in which the lesion was chiefly in the left ear, and in which the direction of reeling was principally forwards, but sometimes backwards, while occasionally there was a sense of rotation on a vertical axis, always from left to right. This last would, according to recent writers, be due to irritation of the left horizontal ampulla, while movements forwards and backwards would respectively answer to irritation of the posterior and superior canals. Destruction of the same parts would, however, produce precisely the converse effects; and thus there is no difficulty in accounting for the fact that some patients have shown a tendency to reel towards the side on which they were deaf. In either case the actual movements are supposed to be the reflex results of the impressions conveyed to the co-ordinating centre from the various canals, which under normal conditions balance one another, but which no longer do so when some of the canals are diseased or injured.

Even when morbid changes in the meatus or tympanum are obviously present, the writers whose views I am endeavouring to expound suppose that the direct cause of vertigo is disorder of the labyrinth. As they point out, pressure upon the fenestra ovalis can easily be conceived to cause increased tension in the semicircular canals. Thus they regard all instances of "auditory vertigo" as alike examples of Ménière's disease.

But it would be a great mistake to suppose that Ménière

himself merely wished to draw attention to the fact that vertigo was apt to occur in those who suffered from deafness or from some disease of the organ of hearing. What was really new in his paper was that he endeavoured to show that sudden apoplectiform symptoms (including at least a transient loss of consciousness) might occur in a person previously healthy, and be followed for the first time by deafness, and that the cause of such attacks might be an affection of the internal ear. He relates several cases of patients who fell down insensible, and who, when they recovered, were found to be deaf; and a similar instance has been recently recorded by Knapp.

The only one of Ménière's cases in which a post-mortem examination was made is the tenth and last of his series. A young woman, while menstruating, undertook a night journey outside a coach. She suddenly became completely deaf, and was admitted into Chomel's wards. The principal symptoms were constant vertigo and vomiting. She died on the fifth day. At the autopsy no disease could be discovered in the nervous centres: but the semicircular canals in each ear contained a reddish plastic substance. I cannot say that this observation commends itself very powerfully to my own mind. Cases in which an autopsy fails to reveal a satisfactory explanation for cerebral symptoms that had been present during life are, after all, not so very rare; and it seems rash to assume that the state of the labyrinths was the real cause of the fatal illness in Chomel's patient. Moreover, as Bremner points out, even if full value were allowed to the case in question, one could hardly take it as demonstrating the nature of those other cases in which cerebral symptoms come on suddenly and rapidly pass off. In these it has been supposed by some writers, including Knapp, that hæmorrhage takes place into the semicircular canals. They do not seem to have found any difficulty in the fact that the blood must be effused on both sides at or about the same time, since the deafness often comes on simultaneously in the two ears. But this appears to me to render the explanation very improbable. It is true that hæmorrhage into both retinæ occurs in cases of Bright's disease; but surely not so as to cause sudden and total blindness.

A different view has been suggested by Dr. Wilks; namely that when there is no affection of the meatus or tympanum, the deafness and the cerebral symptoms are both in some cases due to changes in the nervous centres. It is evident that such an explanation is particularly applicable to cases of Ménière's disease in the stricter sense of that term; the sudden loss of hearing in both ears may fairly be attributed to an affection of the auditory centre; and the giddiness to a similar affection of the centre for equilibrium, which is probably adjacent, since its most important afferent nerves are those which come from the semicircular canals. It seems to me that whatever peculiarities in the direction of the vertiginous tendencies may be observed, such as have been supposed to depend upon affections of particular ampullæ, they can all be referred to corresponding changes in the centre, for in this the functions of each canal must necessarily be fully represented. The analogy of the other paroxysmal neuroses seems to support very powerfully Dr. Wilks' view. We have seen that impairment of sight is a frequent symptom of migraine, and that it is certainly due to an affection of the brain and not of the eyes. Indeed, "cloudiness before the eyes" and "obscuration of the visual field" are mentioned as having been present with the vertigo in some of Ménière's and Knapp's cases; and it may be that in these instances the attacks presented a combination of the two neuroses, the nerve storm spreading beyond its usual limits and encroaching upon the area concerned in migraine. So also it seems to me that, in the "apoplectiform" cases, such as Ménière described, the simplest way of accounting for the loss of consciousness is to suppose that the disturbance diffused itself over the hemispheres, as I believe that it does in epilepsy.

Another strong argument in favour of Dr. Wilks' view is afforded by the fact that (as I have often had occasion to observe) bromide of potassium may remove both the giddiness and the loss of hearing at the same time; and Mr. Hinton has recorded under the name of Ménière's disease a case in which paroxysmal vertigo and sickness had been associated with only transient deafness, and in which all these symptoms together were brought back by the administration of

quinine, after having been removed by treatment of a different kind.

Knapp has observed that in certain cases the impairment of hearing is particularly marked for certain musical tones, those of the middle octaves being distinctly perceived, while those of the lower, and still more those of the higher, octaves are heard very imperfectly. He suggests that this is a proof that the seat of the affection is in the labyrinth; but I fail to see the force of the argument. Much more weight, however, must be allowed to an observation of Charcot's, that some patients experience sensations of vertigo and buzzing in the ears, only so long as the deafness is partial, losing these symptoms as soon as it becomes complete. But even if we should have to admit that in these instances the internal ear is really the part primarily affected, it would by no means follow that the same thing is true of the "apoplecticiform" cases, nor that the vertigo is anything but a neurosis. It is one of the advantages of the view which I advocate, that it admits of the production of the same symptoms in many different ways, the symptoms themselves being nevertheless always the result of one particular kind of nervous disturbance. Just as migraine may be excited by a variety of causes, so may paroxysmal vertigo.

Indeed, the analogy between these two neuroses must now be carried a step further. I have discussed in detail the question whether migraine is ever due to disorder of the digestive organs; and I came to the conclusion that such disorder certainly plays a part in its causation. Now writers describe a "*stomachal vertigo*" as distinct from other varieties of giddiness. I think, indeed, that the stomach is not really so often concerned in the production of vertigo as the liver, the most potent of all morbid states of the abdominal organs being the condition which, following Dr. Murchison, I would call lithæmia. This, however, is a matter on which I cannot enter. What I am now concerned with is the question whether the giddiness due to disorder of the chylopoietic viscera is different in kind from that which depends upon other conditions, such as deafness. Dr. Wilks has made the remark that the vertigo caused by derangement of the liver occurs chiefly when the patient stoops or lays his head upon

the pillow, and ceases when he stands upright. But it will presently appear that this distinction cannot be upheld; and my own belief is that in many cases there is nothing in the character of the nervous symptoms themselves, nor in the circumstances under which they arise, to show that they depend upon one rather than another of the various causes to which they might possibly be attributed.

In some cases the ingestion of food which disagrees with the patient leads so quickly to swimming in the head that the connection could not be overlooked. Dr. Murchison speaks of a medical friend of his, who has long suffered from gout, and who, whenever he drinks a cup of tea or a glass of champagne, is seized with sudden giddiness. His head feels empty, and neighbouring objects seem to whirl about him; he would fall, did he not lay hold of something to support him. After a few seconds or minutes the attack passes off. In other patients, as Dr. Murchison remarks, the vertigo lasts longer. Dr. Ramskill relates the case of a merchant who was one day quietly walking in the city from one office to another, when he was seized with giddiness, so that he reeled, and had to lay hold of a post which was near at hand. In a few hours, after a free evacuation of the bowels, he became better, but he felt weak and shaken, and complained of a heavy diffused headache. About three hours before the attack he had eaten hastily, and with imperfect mastication, a breakfast of which sausages and Devonshire cream formed a part; and to this the vertigo was ascribed, no doubt with justice. Yet, during the following month, the same gentleman had five similar attacks, not one of which could be traced to any such cause, he having in the meantime become very particular as to his diet. Dr. Ramskill even goes so far as to say that in "stomachal vertigo" it is the exception for one to be able to trace any positive signs of stomach disorder. The proof is that the complaint is cured by treatment directed to the regulation of the digestive organs. Thus, a medical friend of Dr. Murchison's, who had never had gout, and in whose case the only recorded indication of lithæmia was that his urine was often loaded with lithates, was seized with dimness of sight and giddiness every night while writing. He took iron and quinine and other tonics, but without any benefit. He was

advised to give up practice for a time, and try the effect of a change of air; but while he was making up his mind to so serious a step, he took a few grains of blue pill, whereupon his symptoms at once disappeared. So, again, Boerhaave's commentator is quoted by Trousseau as relating the case of a man who, during two years, was always seized with vertiginous symptoms whenever he attempted to stand up. In vain had the ablest practitioners attempted to cure him. Quite suddenly he had an attack of gout, of which disease he had before shown no indication; and from that time the giddiness ceased.

To complete the chain of evidence which proves that vertigo is one of the paroxysmal neuroses, I must next point out that it may replace other members of this group of affections. Giddiness is occasionally present during the paroxysms of migraine; and Dr. Liveing refers to two cases, in each of which an attack of intense vertigo, of short duration, appeared several times to replace the ordinary sick headaches. The connection of vertigo with epilepsy is, perhaps, closer still. As I have already mentioned, giddiness is one of the symptoms of many cases in which fits take the form of the *petit mal*; and that affection is very often only the precursor of the *haut mal*.

Still there are cases in which this neurosis remains unchanged in type for many years. Dr. Ramskill speaks of such under the name of "essential" vertigo. He even states that he has met with two instances in which the complaint appeared to be transmitted by direct inheritance. One of his patients suffering from vertigo had a father living, and then aged seventy-one, who had himself been subject to it for thirty-five years; he also had asthma. Another patient of Dr. Ramskill's complained for three years of giddiness, for which no cause could be discovered, and which resisted all kinds of treatment. It is true that in that case the giddiness after a time became almost continuous; and I suppose that *persistent* vertigo is more commonly due to anæmia or to disease of the arteries of the brain than to any other causes. But it seems probable that in exceptional instances any one of the paroxysmal neuroses may cease to present intervals, or to occur in distinct attacks, when the patient has been subject to it for a considerable length of time.

Epilepsy.

Scarcely any chapter of a work on medicine could be written without reference being made to the occurrence of epileptiform fits—attacks characterised by loss of consciousness and convulsive movements of the face and limbs. Such an attack may accompany the onset of an exanthem, such as variola, or it may occur where life is being extinguished by hæmorrhage. Or, again, it may be produced by Bright's disease of the kidneys, or by lead poisoning, or by many different organic affections of the brain.

In remarkable contrast with the various cases just referred to, in all of which the fits are accidental or occasional, or even of solitary occurrence, fits of precisely the same kind return again and again in many patients for years together, and often without one's being able to trace this to any cause except an inherited tendency to nervous disorder. One cannot but regard such cases as essentially distinct from the others, and as requiring a special name; and it accords both with custom and with common sense that we should speak of them as *epileptic*, and call fits which are of accidental origin *epileptiform*. To the latter, indeed, we may (if we choose) apply the designation of *eclampsia*, which is commonly employed by obstetric writers for the fits that are apt to occur after childbirth.

But in limiting the use of the word *epilepsy* to a recurrent paroxysmal neurosis one must carefully avoid an error into which it is easy to fall, namely, that of imagining that underlying the attacks there is an essential disease which can be conceived to exist independently of them, and of which they are the "*symptoms*." The fits themselves constitute the disease, the only other element in its definition being the clinical fact that they tend to return at more or less regular intervals for an indefinite length of time.

Indeed, the distinction itself is by no means always easy of application. Thus, Dr. Hughlings Jackson mentions a case in which a convulsive fit at the onset of scarlet fever proved to be the forerunner of habitual epilepsy. Again, it is said that the simulation of the disease by impostors has ended in their

becoming really subject to it; and, if true, this is a still stronger fact in the same direction. Dr. Brown-Séquard even found that the guinea-pigs in which he artificially set up epilepsy transmitted it to their offspring.

On the other hand, some very remarkable cases have occurred which show that even when epileptiform fits have occurred at intervals for a very long period, as the result of irritation of the nervous centres by some cause acting on a distant part, the liability to their recurrence may cease entirely when the cause in question is removed. Thus, Mr. Tomes relates the case of a farm-labourer suffering from epilepsy who had the usual remedies administered to him in the Middlesex Hospital for six weeks without effect. His mouth was then examined and the molar teeth of the lower jaw were found to be decayed, the fangs of some of them alone remaining. Although he complained of no pain they were removed, and they were found to be enlarged and bulbous from exostosis. During the eighteen months that followed he had not a single fit, although for many weeks before the operation he had had two or three daily. Another case, recorded by Dr. Ramskill, is that of a boy who for eighteen months had had epileptic fits, and in whom it was noticed that before the fits he used to rub his left cheek on account of an indefinite uneasiness, not amounting to pain. On examination a molar tooth considerably decayed was found; this was removed, and from that time the boy did not have another fit, although he remained under observation for four months. It is to be said, however, that during that period belladonna was administered. But the most extraordinary case of all is one, related by Trousseau, of a young clerk, who for several years had been subject to monthly attacks of epilepsy; remedies had been tried in vain at the Hôtel Dieu, when Dr. Foville suggested the extraction of some carious teeth which ached constantly. The suggestion was acted on, and from that day the fits disappeared.

Trousseau also relates the case of a man, *æt.* 40, who on several occasions, at very short intervals, was seized with violent epileptic attacks. Dr. Monnier found that he had been passing fragments of *tænia*, and gave him large doses of castor oil; a whole tapeworm came away, and from that time the convulsive fits ceased.

Again, an injury to the head may be the starting-point of habitual epilepsy. Nothnagel gives the case of a boy who when eight years old fell from a height of twelve feet upon his head upon a hard floor. He was stunned for a quarter of an hour, and ten minutes after recovering consciousness he had a characteristic epileptiform fit. There was a little scalp-wound, which healed in a few days. After six weeks he had a second attack, and from that time they recurred at periods which became shorter until he had them at intervals of from four to twelve days. He was twenty-one years old at the time when Nothnagel wrote, and his intellect and memory were already somewhat impaired. A slight scar remained, but this was not painful nor adherent. Nothnagel seems not to have thought that surgical interference would have done any good; and perhaps he was right. But in the 'Lancet' for 1873 two cases will be found recorded, in each of which a piece of the skull was removed by the trephine on account of epileptic fits following an injury to the head. Both of them occurred at Guy's Hospital, the one under Mr. Cooper Forster's care, the other under that of Mr. Bryant. The former patient had had a blow on the head four months before his admission; it left a slight swelling, from which a little pus exuded when it was incised. His first fit occurred the day before he came into the hospital. But a week later he was having four or five fits every hour, and his temperature was 103° . The operation was then performed, and the piece of bone which was removed was very dense, three eighths of an inch thick in one place, and rough on the outer surface. A fortnight afterwards he could walk the length of the ward, and he never had another fit—at least until the time when the report of the case ceases, which was two months from the date of the trephining. In the other case the accident had occurred five years before, and attacks of the *petit mal* had occurred at intervals of about a week during the whole period. The cicatrix was still tender, and occasionally painful. Medicinal treatment having been tried without any good result, the trephine was applied and a piece of bone, which was much thickened, removed. The fits at once became less frequent, and seemed to occur only when he was depressed from want of food in his miserable home, or when he was

exhausted by diarrhoea. The very same medicines which he had before taken with no benefit were resumed. After a time he became able to earn his living, and when the case was reported (sixteen months later) a confident hope was expressed that he would remain free from attacks for the future.

One point in favour of the existence of a real distinction between epilepsy and eclampsia (in the meaning given to that term at p. 394) is the observation of Dr. Tyler Smith that puerperal convulsions are by no means of very frequent occurrence in women who are habitually subject to epileptic fits. But it is clear from the foregoing paragraphs that there may in practice be great difficulty in applying the distinction in question. And another instance of the same difficulty is afforded by infantile convulsions. On the one hand, it is said that persons subject to epilepsy in adult life are often found on inquiry to have had fits in early childhood. Nothnagel expressly states that this is often the case with children born of epileptic parents, and who in later years themselves become epileptic. But, as Dr. Jackson points out, there are at present no facts to show what is the proportion of those who having had infantile convulsions afterwards escape epilepsy. It can hardly be doubted that they form the immense majority. The fits of infants were formerly attributed simply to irritation of the nervous centres from teething or disorder of the alimentary canal. But the more closely such supposed causes are inquired into the less clear does their relation to the convulsive attacks appear to be. The tendency of modern observation is rather to associate infantile convulsions with rickets, just as is the case with laryngismus stridulus. And whatever part in their causation one may suppose to be taken by external sources of irritation, it is certain that another very important part is taken by inherited or acquired conditions of the nervous centres, disposing them to convulsive discharge. It may well be that in infancy the brain, being imperfectly organised, yields to influences which in after life it successfully resists. One would commit a serious error if one were to say that the occurrence of fits in early life involved, as a general rule, the danger that epilepsy would supervene later on. And yet it seems to me clear that no absolute line of

distinction between them can be drawn; nor, in general, between habitually recurrent epilepsy and the various forms of eclampsia, or of epileptiform fits due to external irritation.

But I think that the difficulty is in a great measure avoided if we regard all these affections as members of the large group of paroxysmal neuroses. In the case of migraine also we have variations in the gravity and clinical significance of the attacks, according to the time of life at which they occur.

With regard to the pathology of epilepsy much uncertainty of opinion still prevails. So soon as an attempt was made to distinguish the functions of different parts of the nervous centres, it was suggested that in a fit there was a torpor of the brain, associated with excitement of the spinal marrow. But the regular order in which the phenomena of the paroxysm succeed one another is evidently inexplicable under such a simple hypothesis. And with the advance of physiology the theory arose that the disease might have its seat in some particular part of the brain, which would be the starting-point of the attacks, and which might fairly be termed the "epileptic centre." I remember that Sir W. Gull used to speak of epilepsy as a "function;" and by this I understand him to have meant that the orderly development of the various symptoms which constitute the seizure must depend upon structural nervous arrangements, like those involved in the more complicated physiological actions. Thus, Van der Kolk suggested that the medulla oblongata was the seat of epilepsy; and recent writers, including Dr. Russell Reynolds and Nothnagel, have expressed a similar opinion, only including within the area of disturbance more or less of the pons Varolii, or of the cervical part of the spinal cord.

I think, however, that we must either confine within very narrow limits the supposed "epileptic centre," or else include in it the entire length of the spinal cord. We cannot imagine that spasmodic movements of the eyes or of the face bear to such a centre any closer relation than do those of the upper or even of the lower limbs. And, if we once give up the idea of fixing the seat of the disease in a definite spot within the medulla oblongata, a little consideration will lead us to include in the affected area the mass of the cerebral hemispheres.

There is no other way in which we can so simply explain the facts that consciousness is suspended and that delirium and excitement are often present. I may mention Dr. Wilks as one writer who has always strongly expressed the opinion that epilepsy is an affection of the whole of the brain.

The views entertained by Dr. Hughlings Jackson are widely different. This observer has studied with the greatest care these epileptiform and other convulsions which are caused by local diseases, such as tumours of the surface of the brain. He has laid great stress on the fact that whereas a "destroying lesion," affecting a particular convolution, is incapable of causing paralysis, a "discharging lesion" of the same part gives rise to convulsions, which may implicate the opposite face, arm, and legs in a definite order. His way of accounting for this is to suppose that in particular convulsions movements are "represented," which involve the action of many different muscles.

In 1873 Dr. Ferrier performed a series of experiments on the lower animals with the express object of throwing light on Dr. Jackson's theories with regard to epilepsy. Fritsch and Hitzig had shown in 1870 that, instead of the surface of the brain being insensible to the galvanic current, its application to some of the anterior convolutions gave rise to definite muscular movements; and they had laid down the seat of cortical centres for the muscles of the neck, of the face, and of the upper and the lower limbs—at least, so far as dogs were concerned. Dr. Ferrier's observations were made on cats and rabbits also; and, still more recently, on monkeys. His results do not altogether accord with those of the earlier experimenters. He distributes the motor centres over a much more extensive surface, making them reach quite to the back of the hemispheres, whereas Fritsch and Hitzig had limited them to a comparatively small area in front of the fissure of Rolando. Still his observations on different animals present so complete a correspondence in their broad results, that one may fairly place a general reliance on his conclusions.

More than one writer has endeavoured to throw discredit on these investigations, on the ground that the galvanic stimulation may have passed downwards to the basal ganglia, and so have caused the movements observed. And Hitzig has expressed the opinion that Dr. Ferrier's conclusions

are incorrect, in so far as they differ from his own ; and that the induced current which Dr. Ferrier employed was too powerful to yield trustworthy results.

But it seems to me that the general conclusions at which these observers have arrived have not been invalidated, and that we may fairly regard as established the physiological doctrine that the anterior convolutions of the hemispheres contain a series of motor centres in which definite parts of the body and limbs are represented. A recent statement of Dr. Ferrier's on this head is as follows:¹

"The motor centres of the limbs are situated in the convolutions bounding the fissure of Rolando. The centres for the leg are situated in the postero-parietal lobule, and upper part of the ascending parietal convolution. The hand and arm centres are localised in the ascending parietal and upper divisions of the ascending frontal : centres for different actions being distinctly differentiated. The posterior divisions of the superior and middle frontal convolutions contain an area of which stimulation causes the head and eyes to be directed to the opposite side, and the pupils to dilate. The facial muscles, and the muscles of articulation, have their centres in the ascending frontal in regions corresponding to the posterior extremities of the middle and inferior convolutions respectively."

And, pathologically, it would seem that, when convulsions are set up by local disease of the surface of the brain, the fact that certain parts are especially implicated in the spasms may sometimes enable us to indicate the seat of the lesion.

Thus, in his earliest paper Dr. Ferrier quoted two cases of Dr. Jackson's, in each of which fits occurred limited to the right arm, while in each of them the disease was discovered after death to be situated in the hinder part of the uppermost frontal convolution of the left hemisphere. In the second case, in which innumerable fits of the same character occurred, Dr. Jackson had said beforehand what would be the seat of the lesion.

But I may add that I recently made an autopsy in a case in which a small glioma was situated in precisely the same spot, on the right hemisphere, and in which it had been noted

¹ 'West Riding Lunatic Asylum Reports,' iv, p. 50.

that the fits usually commenced in the left foot. And in the notes of Dr. Ferrier's experiments on monkeys I find that the inner end of the ascending frontal convolution is included in the centres for the leg, rather than in those for the arm.

It is quite another question whether any similar conclusion is warranted, when there is no other evidence to show that local disease of any part of the surface of the brain is present. Dr. Burdon Sanderson has found by experiment that stimulation of the medullary fibres between the convolutions and the corpus striatum produces effects exactly resembling those of stimulation of the various convolutions themselves: and there seems no reason to doubt that equally definite results might be produced by morbid processes starting in different parts of the basal ganglion itself, even if it should be practically impossible to exhibit them experimentally.

It must also be borne in mind that the spasmodic movements produced by disease,—such as are observed in a convulsive attack of whatever kind,—are very different in character from the slow and orderly actions to which galvanic stimulation of the brain gave rise in those of Dr. Ferrier's experiments, from which alone conclusions as to the functions of particular convolutions could be drawn. It is true that spasmodic contractions, and even complete epileptiform fits, were often observed: but these received further explanation, as will presently appear. The cases to which I now refer are those in which we read, for example, of a cat raising the shoulder and adducting the forepaw, exactly as if it was striking a ball; of a rabbit munching with its lips and jaws; and the like. But in a fit the affected part is violently jerked backwards and forwards, in a way altogether different from what occurs in its natural movements. I think that this would of itself suggest the view that convulsive movements do not depend merely upon the "discharge" of the cortical centres, but are the results of impressions transmitted downwards from them to the corpus striatum, or even, perhaps, to ganglia situated still lower in the cerebro-spinal axis.

But the case is far stronger, when instead of localised spasms, a complete epileptic paroxysm occurs, in which all parts of the body are convulsed, and consciousness is for the time suspended. I confess that I am at a loss to understand how

Dr. Jackson can regard this as the result of the mere discharge of one or more cortical centres.

Dr. Ferrier has discussed this question very fully in the fourth volume of the 'West Riding Lunatic Asylum Reports,' at p. 49. His theory is that in the cortex of the brain there are individual centres for each separate muscular action involved in the epileptic convulsion, that they are related to each other in a constant and definite order, and that the attack is due to the discharge of these centres in a tolerably uniform manner. Much, he says, depends on the primary source of the irritation: but a little further on he adds that from whatever part of the hemisphere this proceeds, whether from a motor centre, or from the sensory areas towards the back of the brain, the order most commonly observed is that the centres seem discharged from before backwards, beginning with those of the head and eyes, and ending with those of the leg. He goes on to say that epileptic convulsions can be produced with as great readiness by application of the irritation to the sensory areas as to the motor centres themselves:—and, again, that it is doubtful whether consciousness becomes lost when the motor centres of the brain are alone implicated.

It appears to me that Dr. Hughlings Jackson's views, in their most special form, are by these statements of Dr. Ferrier deprived of all the support which they might seem to have gained from the experimental facts adduced by him. And Dr. Ferrier's own hypothesis seems to me far less likely to be correct than the older opinion that, even when irritation of the surface of the brain causes an epileptic fit, the actual motor impulses start from the basal ganglia or even from centres in the pons, medulla oblongata, and spinal marrow. Surely, the orderly development of the phenomena of the paroxysms which he points out, and on which I have already laid stress, is much more easily explained in this way.

Again, it is well known that there are cases in which epileptic fits are set up by irritation of spinal nerves, by diseased teeth, or (as in Brown-Séquard's experiments) by pulling the hairs on the face of a guinea-pig, of which the spinal cord has previously been injured. All such cases are obviously much more easily explained on the view that the parts which

are the seat of "discharge" in the attacks are the lower centres, than on the theory that they are the highest centres of all, situated in the convolutions.

It seems to me that a further argument on the same side may be found in the analogy of another paroxysmal neurosis. I have already pointed out that a tumour in the brain, at a distance from what one can suppose to be the seat of migraine, may excite repeated attacks of it. One certainly cannot imagine that these are due to "discharge" of the part which is immediately affected by the tumour; they must be due to an influence transmitted downwards to the optic thalamus or to other sensory ganglia.

But the strongest argument of all against the view that an ordinary complete epileptic paroxysm can be caused by discharge of cortical motor centres is derived from the extreme rarity with which these paroxysms are replaced by partial attacks of spasm without loss of consciousness, such as are well known to occur when there is local disease, affecting one or more of the convolutions. One does not see why the *haut mal*, which so often has its place taken by the *petit mal* or by insensibility without convulsions, should not as frequently be represented by a fit of convulsions without insensibility; but as a matter of fact this happens exceedingly seldom. The only two instances that I have read of are recorded, the one by Trousseau, the other by Nothnagel. The former occurred in a young man, æt. 18, who was liable to convulsions of the facial muscles, affecting only the left side, and not accompanied by loss of consciousness, nor by any other epileptic phenomena. But the clinical history was that the disease had first set in six years previously with violent fits of the *haut mal*, and that these had gradually become milder and passed into those of the *petit mal*, which (I suppose) occurred alternately with the attacks of mere partial clonic spasm. Nothnagel's case was in a boy, æt. 16. Dr. Reynolds, indeed, who gives to this form of the disease the very appropriate name of abortive epilepsy, furnishes a list of references to various writers as having described it. I have looked up most of them, but it is not clear to me that the writers in question took care to exclude cases of cerebral tumour and the like. Thus we scarcely ever meet with an exception to

the rule that there is local disease of the brain in all cases in which attacks of clonic spasm recur paroxysmally without loss of consciousness.

Surely this points strongly towards the belief that when a complete epileptiform fit arises as the result of some local disease, it is not due to a mere discharge of a particular convolution, or set of convolutions, but is the result of an impression transmitted downwards to the central ganglia: and from them diffused again upwards over the hemispheres.

At the present time a view is widely prevalent, according to which all but the initial phenomena of an epileptic attack result from vaso-motor disturbance. It is supposed that the cerebral arteries undergo spasmodic contraction, and that the consequent anæmia of the brain causes the patient to fall down insensible. It is well known that the face commonly turns pale at the commencement of a seizure. There is ophthalmoscopic evidence that the retina, which derives its blood-supply directly from the internal carotid artery, also becomes anæmic. Dr. Hughlings Jackson and Dr. Charles Aldridge have proved that the optic disc is pale or even white, and that the arteries which traverse it are much diminished in size. It is to be noted, however, that on the single occasion on which the ophthalmoscope has been used before the clonic convulsions ceased, the disc was at first pink, so as to be undistinguishable from the surrounding choroid; and that it only afterwards became white, and then slowly.

But I believe that the most substantial support of the notion that the brain is essentially anæmic during an attack of epilepsy has been afforded by the well known essay of Kussmaul and Tenner. It had before been known that both in animals and in man loss of blood was often followed by convulsions. These observers showed that the like result could be brought about by ligature or compression of the four great arteries supplying the encephalon. In reality, however, their experiments only proved that a deficient supply of blood to the brain might be one cause of attacks of an epileptiform kind. They themselves pointed out that ligature of the trachea, rendering the arterial blood rapidly venous, had the same effect; and in either case they referred the convulsions to sudden interruption of the nutrition of the brain. Their

theory evidently does not in any way confirm the more modern opinion that when an epileptic fit has commenced in the medulla oblongata, the patient becomes unconscious as the result of some reflected influence upon the cerebral arteries, rendering the brain anæmic.

For I think that, after all, the feature of epilepsy most difficult of explanation is the tendency of the fits to recur at more or less definite intervals. And no way of accounting for this seems to be so satisfactory, as that which refers it to a gradual accumulation of energy in the nervous centres, which is dissipated during the attacks. As Van der Kolk points out, it often happens that after a severe fit an epileptic patient remains free longer than usual; but if he should have only a slight attack, he soon afterwards has another, perhaps on the following day. Again, in some cases each fit is preceded by a gradually increasing irritability of temper and restlessness, which disappear or are notably diminished after it has taken place. Other patients, as Trousseau remarks, become gay, loquacious, and excited for some hours before an attack; and yet others complain of failure of memory, of torpor, and of physical and mental prostration. Nothnagel mentions the case of a lady, generally a light sleeper, who always knew when she was about to have a paroxysm, because on the previous night she would sleep very heavily and long; she nevertheless woke up feeling quite well, and was not attacked until later on in the day.

We are thus brought in regard to epilepsy to the same point which we reached in discussing the nature of migraine: that it is essentially a paroxysmal neurosis, recurring at more or less regular intervals. And, as in the case of migraine, it appears to me that in all probability the alterations in the blood-supply to the brain, which undoubtedly occur during the epileptic attack, are accidental concomitants rather than essential to the development of any of its symptoms. This view is not inconsistent with the fact that the inhalation of nitrite of amyl is sometimes of service in the treatment of the disease; for when there is an aura the attack can sometimes be overcome by a decided impression on the part to which the aura is referred, and the inhalation may fairly be supposed to act in a similar way, and to cut short the paroxysm by

arresting one of its phenomena. Moreover, venesection is sometimes useful: and, so far as I know, under the same circumstances as those in which the nitrite does good. Yet they must produce contrary effects.

To sum up, then, I would adopt the language of some modern writers, and say that epilepsy is "dependent upon an unstable condition of the nerve-tissue in some portion of the nervous system, permitting occasional discharges." This, in reality, is not stating more than that the disease is a "nerve storm." And just as in migraine teichopsia may be followed in succession by numbness in the fingers, by headache, by vomiting, by sleep:—so in epilepsy, tonic spasms give place to clonic convulsions; and these, again, to stupor or coma. To me it appears more satisfactory to refer this sequence of phenomena to the gradual extension of some morbid condition from one part of the nervous centres to another, than to ascribe it to modifications in the blood-supply.

Amongst the occasional results of an epileptic fit is a loss of muscular power in one arm, or in both the arm and the leg on one side, generally that side which was the more convulsed. Dr. Todd described this under the name of epileptic hemiplegia; it may either pass off in a few hours or last some days. One must not forget that diminished mobility of the arm after a fit is sometimes due to a very different cause, namely, to dislocation of the shoulder, produced sometimes by muscular spasm, sometimes by direct injury, the patient having struck that part in falling. I myself once nearly overlooked this accident. A patient came with her arm hanging helpless; I was pointing out to the students that a transient paralysis often follows an epileptic attack, when I happened to notice that touching the limb gave pain; I grasped the deltoid muscle, and found that the head of the humerus was out of place. At one time a woman who was liable to epileptic fits used frequently to come to the hospital to have her shoulder set; in her case the fact that the same dislocation occurred again and again showed that spasmodic contraction of the muscles was its cause. Still more serious injuries sometimes arise during a paroxysm. The skull may be fractured by the patient dropping down on the pavement or on a stone floor; or he may be severely burnt, if he should happen to fall

against the bars of the grate; or he may in a crowded thoroughfare be run over. Persons who are liable to epilepsy cannot be too closely looked after.

There has been considerable difference of opinion as to whether dementia should or should not be regarded as a regular consequence of habitual epilepsy. I am myself strongly inclined to agree with Dr. Wilks, who would answer this question affirmatively. But it is important that we should remember that impairment of the intellect is by no means confined to patients who have already suffered for a long time from epilepsy. In children it often happens that a series of fits, continued for a few successive hours, produces a permanent state of imbecility, or even of mania. A considerable proportion of those who are admitted into asylums for idiots are children who were, in reality, born with full powers of intelligence, and learned to talk as soon as others; but, having been attacked by epilepsy when perhaps four or five years old, they have since lost all sense and intellect, have become dirty in their habits, passionate or violent in temper, or even incapable of recognising their parents. Such cases are frequently brought to the out-patient departments of the London hospitals.

Paroxysmal Insanity.

Another affection which I think should be regarded as an independent member of the series of nerve-storms is what we may term paroxysmal insanity. It has by Falret and others been called epileptic insanity—*furor epilepticus*. But this expression is ambiguous, since it has been used as a general name for all mental disorders which may accompany or follow epileptic attacks. Moreover, it appears that in some cases, at least, such attacks are altogether absent. One could not find a more perfect example of paroxysmal insanity than one which Dr. Maclaren has recently (January, 1876) recorded in the 'Medical Times and Gazette.' The patient had never had epileptic fits. Many striking instances of the affection in question associated with epilepsy are recorded by Trousseau in his 'Clinical Lectures;' and Dr. Hughlings Jackson has

recently published an admirable article upon the subject in the fifth volume of the 'West Riding Lunatic Asylum Reports.' Dr. Jackson, indeed, expresses the opinion that in all cases of this kind a transitory epileptic paroxysm actually occurs each time before the mental symptoms develop themselves. In other words, he thinks that the affection is identical with the mania which is well-known to occur sometimes after an attack of the *haut mal*. This view, however, seems to rest upon a highly theoretical basis. Dr. Jackson supposes that the mental disorder is automatic, and that a necessary condition for its occurrence is the removal of the control of the highest centres, which are exhausted by having discharged themselves during the fit. But such a theory involves the postulate that in an epileptic fit the highest centres can be affected apart from those below them, and this I have already endeavoured to combat.

Tetany.

In the paroxysmal affections hitherto described convulsive movements, if present at all, have generally been of a clonic kind. The only instance of tonic spasm has been at the commencement of the epileptic attack. But there is one member of the group in which tonic spasm is the essential symptom. This is the disease to which Lucien Corvisart in 1852 gave the name of tetany; previously it had been described by Dance in 1831 under the title of intermittent tetanus; and other observers had designated it "idiopathic contraction of the extremities" or "rheumatic contraction of the extremities." I believe that Trousseau's lectures, one of which is upon the subject of tetany, first drew attention to it in this country; the earliest case that I know to have been recognised clinically is one recorded by Dr. Moxon in a paper in the 'Guy's Hospital Reports' for 1870.

As may be supposed from some of the other names that have been given to it, tetany is generally confined to the limbs, and affects chiefly the distal ends of them. Sometimes it is limited to the forearms and hands; much more rarely to the legs and feet. Commonly it involves all four extremities at the same time, or alternately.

A disease presenting in a well-marked form the characters commonly ascribed to tetany is undoubtedly of very rare occurrence. I am not aware that more than two or three such have presented themselves at the hospital since the one which came under the care of Dr. Moxon in 1870. But it appears to me that a very common affection is in reality a minor form of it; I refer to the "carpo-pedal contractions," or "turning in" of the thumbs and great toes, which one looks for almost as a matter of course in rachitic children, whose nervous centres are in a state of irritation. Dr. Hughlings Jackson, indeed, regards these as rudimentary forms of ordinary epileptiform convulsions; but surely they bear a much more obvious relation to tetany. And I cannot help thinking that careful observation in out-patient practice would bring to light intermediate conditions which have as yet escaped notice.

But it is by no means necessarily the case that in tetany the spasms are limited to the extremities. Trousseau describes instances in which the face and trunk were also affected. In these cases the face became distorted; the eyes acquired a squint; the sterno-cleido-mastoidei, and the pectorales, were rigid; the recti abdominis stood up like tense cords. The jaws were firmly clenched, and the speech even was impaired, in consequence of the tongue having become involved. Laryngeal spasm sometimes occurred, causing lividity and apparent danger of suffocation. Febrile disturbance was also present. Yet, even in such severe cases, the patient would often get up; and if an adult, she would attend on other patients, although suffering from pains in the loins, and feeling bruised and exhausted. Sooner or later recovery almost invariably took place. Trousseau, indeed, mentions one instance in which death occurred from phthisis during a relapse of tetany, and another, which he supposed to have terminated fatally within a few hours from its commencement. Dr. Moxon has suggested that this was really a case of tetanus; but the hands and feet were characteristically affected; and these are the very parts which in that disease constantly escape the spasms.

If I am right in regarding tonic spasm of the fingers and toes as distinctive of tetany, I think that we must also include under that head another affection of early life; namely, the

"Trismus neonatorum." This occurs in infants within a week after birth, and sometimes even in the first twelve hours. From Dr. West's description of its symptoms it appears that, besides trismus and opisthotonos, there are powerful clenching of the hands, flexion of the feet upon the ankles, and bending of the toes; and he goes on to say that "when the fit subsides the child still lies with its hands clenched, and its thumbs drawn into the palm, the legs being generally crossed, and the great toe separated widely from the others." The head is thrown back; and the opisthotonos continues, although in a diminished degree. Before long the little patient becomes unable to swallow, and perhaps comatose; and death quickly ensues.

It may be thought that the presence of opisthotonos disproves the view that I am disposed to take concerning the *"trismus neonatorum."* And it is true that Trousseau nowhere mentions by name that symptom as occurring in tetany. But he does speak of one patient as having all his muscles rigid, and being as stiff as a poker. And I may remark that in children tonic spasm of the muscles of the back of the neck commonly enough occur, in association with the so-called *"carpo-pedal contractions."*

The relation of these various affections to tetany is, I think, confirmed by their etiology. The trismus of newly-born children was at one time supposed to be a traumatic tetanus, excited by irritation which started from the umbilical cord. But that notion was refuted by the subsidence of the disease in the Dublin Lying-in Hospital, in consequence of the introduction of an effective system of ventilation. Previously, one in every six of the infants born there had died when less than a fortnight old; and nineteen deaths out of twenty were due to trismus. Afterwards the mortality was only 1 in 58 $\frac{1}{2}$, and but a ninth part of it was from the disease in question. I believe that in the West Indian Islands it is still common, and also in St. Kilda; probably, wherever it occurs, it is due to a vitiated state of the air in the lying-in chamber. In London it must be of very rare occurrence, for Dr. West has only seen one case in this city.

I have already remarked that *"carpo-pedal contractions"* occur chiefly in children affected with rickets; and the same

morbid condition has been present in every case of tetany that I have seen. There could be no clearer indication that the hygienic influences have been bad. It is curious that Trousseau speaks of tetany as occurring most frequently in women between the ages of seventeen and thirty, particularly in those who are suckling their children. One is tempted to think that there may be something in the *régime* adopted during the puerperal period by French physicians which lowers the health, and so brings on a disposition to the disease. Trousseau, however, speaks of it as being the direct result of exposure to cold. The woman, whose case he records as having terminated fatally, had shortly before been confined, and had suffered from obstinate diarrhœa. On several occasions she got out of bed in the night, and went to fetch water from a fountain in the yard of the hospital; indeed, she did this on the very night before she died. Trousseau speaks of diarrhœa as a frequent predisposing cause of tetany; he had also seen it after enteric fever and after cholera. He had met with instances of it in women over forty years of age, and even in adult males.

ON THE RECOGNITION
OF
SUGAR IN HEALTHY URINE.

BY F. W. PAVY, M.D., F.R.S.

Does sugar exist in healthy urine? To this question it is important, both from a physiological and a pathological point of view, that we should be able to give a settled answer. The views, however, that are to be seen expressed show that a by no means settled state of opinion exists; and instigated by a desire that at least in my own mind there should be no indecision I have undertaken an examination of the evidence procurable upon the subject, and will here communicate the results obtained.

If the question proposed could be answered by an appeal to the behaviour of tests applied directly to the urine the means of replying would be ready enough. Of the various tests for sugar the cupro-potassic solution is the most delicate and reliable, and when this is used in contact with healthy urine there is ordinarily no reaction perceptible. But does it follow that there is then an absolute freedom from sugar? Tests have a limit to their capacity of reacting, and it may be that the quantity of sugar is too small in the portion tested to be within the power of the test to reveal it. Relying upon the kind of evidence thus afforded, Lehmann¹ asserted that in a normal

¹ 'Physiological Chemistry,' Cavendish Society's Translation, vol. i, p. 289, 1851.

state it is probable no sugar finds its way into the urine; "at least," he says, "after living for two days on fat and sugar I was as unsuccessful in the search for sugar in my urine as Magendie had been in the case of the dog in whose blood he found sugar."

Grounding my conclusion upon the property of diffusibility enjoyed by sugar, and looking at the fact that a minute quantity of the principle exists naturally in the contents of the circulatory system throughout the different parts of it, I inferred, notwithstanding the above assertion of Lehmann, that in compliance with physical laws it should pass off with the urine in proportion to its quantity in the blood. This opinion was expressed in the following terms in one of my Lettsomian Lectures delivered at the Medical Society, and published in the '*Lancet*' in 1860:—"I should say even that the trace of sugar which is natural to the blood throughout the body is constantly being drawn upon by the kidney, but that the amount for removal is so small that it is not susceptible of detection in the urine. Did we possess more perfect means of detection than we do, I imagine that a minute trace of sugar would be reckoned as a normal constituent of the urine."

About this time Brücke was putting into force processes for the separation of sugar with the view of determining whether from large quantities of urine evidence could be obtained of its presence. He first suggested¹ that the urine should be treated with a large excess of absolute alcohol and that a solution of potash in alcohol should then be added. Time was afterwards to be allowed for the sugar and potash compound to become deposited. Later on he proposed² the employment of the acetate of lead in such a manner as to obtain a precipitate of the compound which sugar forms with the oxide of the metal. An inquiry into the value of these processes was made by Dr. Bence Jones and the results published in the *Quarterly Journal of the Chemical Society*, vol. xiv, 1862. The first he pronounces as very imperfect and very costly even with the employment of methylated instead of ordinary spirit.

¹ 'Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften,' Wien, 1858, Band xxix, s. 346.

² 'Untersuchungen zur Naturlehre des Menschen und der Thiere,'—Moleschott, Giessen, 1860, Band vii, s. 70.

With the second he obtained highly satisfactory results and confirmed Brücke in stating that sugar exists in normal urine.

In opposition to this affirmation of Brücke and confirmation of Bence Jones the processes have failed in the hands of Dr. Seegen in yielding an indication of the existence of sugar in healthy urine. Dr. Seegen¹ has published an elaborate dissertation upon the various methods of testing for small quantities of sugar in urine, and sums up by saying that normal urine does not contain enough sugar to allow of its being with certainty proved to exist. He employed both of Brücke's processes and found that the products yielded negative results with the polarimeter and fermentation test but produced a slight reducing action upon the copper test—an effect which it is suggested could not be positively affirmed in our present state of knowledge to be due to sugar.

The relative value of the processes for the separation of sugar from the urine having been ascertained by others I started with the knowledge acquired and resorted to precipitation with lead. As my object was to conclusively determine whether sugar could be shown to exist by all its tests I spared no pains to obtain a large quantity of isolated product for examination. The process for separation was carried on from day to day for a considerable time as fresh portions of urine were obtained and altogether a very large quantity of urine—I may say nearer 200 than 100 pints—has passed through the operation in my laboratory. All the urine taken was derived from healthy persons—viz., from some of those employed in connection with the school department of the hospital. Not a single sample was obtained from the wards. I purposely paid special attention to this point in order that no uncertainty regarding the character of the urine might be introduced. Moreover every sample before being operated upon was examined with the copper test to see that it behaved like ordinary urine and gave rise to no reducing action. If, as sometimes happened, a specimen was met with which produced a change on full boiling with the test it was immediately rejected.

About two or three quarts of perfectly fresh urine having

¹ Brochure from Band lxiv der 'Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften,' Wien, 1871.

been collected, the neutral plumbic acetate was added until a precipitate was no longer produced. The effect of this is to throw down the urea, uric acid, and some other ingredients of the urine, but not the sugar. The precipitate having been allowed to subside, the clear supernatant urine was siphoned off and treated with ammonia and plumbic acetate till neither agent produced a precipitate. Sugar is not carried down by lead in an acid solution, but in the presence of free ammonia it falls as a definite compound consisting of two atoms of sugar and three of oxide of lead. Doubtless some other constituents of the urine also accompany the sugar, and the precipitate, which is of a bulky nature, also contains a large amount of oxide of lead. Ammonia has not the property of redissolving precipitated oxide of lead; but experience shows that, after the successive addition of ammonia and the plumbic acetate has been carried on to a certain extent, neither the one nor the other any longer occasions a precipitate. They are now capable of existing together in the same liquid without any fresh oxide of lead being thrown down. It is desirable to add the reagents until this effect is attained in order to be certain that the whole of the sugar has been removed. It is the precipitate now which has to be dealt with, and the next step is to free it from the surplus reagents and other impurities and then liberate the sugar.

Prolonged washing is required to bring the precipitate to a pure state. This is best accomplished by repeated decantation in a large vessel, and with the employment of hot water the time occupied is considerably shortened, as a quicker subsidence of the precipitate occurs. It is important that the washing should be continued until the whole of the ammonia is removed, as the presence of this agent interferes with the neat reaction of the copper test when the product is being examined for sugar. After several decantations have been performed and the supernatant water no longer affects the colour of reddened litmus paper the precipitate is thrown on a filter and a little further washing conducted.

The precipitate is now ready for the liberation of the sugar. This may be effected by the addition of the sulphuric, oxalic, or hydrochloric acid, or by the agency of sulphuretted hydrogen. Although the latter process involves the occu-

pation of a very much greater amount of time, it is undoubtedly, according to my experience, infinitely to be preferred as it yields a less coloured and purer product. The gas must be passed through the precipitate until its decomposition is thoroughly effected. Without this, the sugar may be left behind and a negative result on testing obtained. Quite fifteen or twenty hours' exposure or even more to a current of sulphuretted hydrogen may be required for complete decomposition to be produced. The gas must be passed through until the whole of the precipitate has become thoroughly black and until it remains in excess. When the process is thought to be complete, a little of the product, after thorough agitation and repose for a short time, may be thrown on a filter and the filtrate treated with the cupro-potassic sugar test. If the gas is in excess, as it should be, its presence will be betrayed by the precipitation of sulphide of copper. To avoid the unpleasantness arising from the escape of the surplus sulphuretted hydrogen into the atmosphere during the operation of saturation, I have been in the habit of having the process carried on in large sealed wide-mouthed bottles, with the escape tube passing through one of the openings into a Bunsen's burner in order that the gas may be destroyed by combustion. Two bottles may be conveniently connected together, so that the gas may be made to pass from one to the other and thus become more effectually utilised.

When the proper decomposition has been effected the product is subjected to filtration, and after washing the precipitate, the filtrate and washings, which will contain any sugar that may have been present, are brought to a small bulk by evaporation over a water bath. A strongly acid reaction exists, and the addition of a slight excess of a saturated solution of the carbonate of soda leads to the deposition of a considerable amount of a coloured substance, which may not appear at once, but does so by allowing twelve to twenty-four hours' repose. Filtration and washing being performed, decolorisation is next effected by animal charcoal, which has been thoroughly purified from lime; and if evaporation, either before or afterwards, by heat is conducted, it is desirable to induce a slight acidity with acetic acid to secure that no

decomposing action is exerted by the existence of alkalinity. The animal charcoal, in detaining the colouring matter, also, it must be remembered, holds sugar with some avidity, and it is found that a pretty extensive washing is required to remove all the sugar belonging to a specimen under treatment. This may be seen by the examination of successive washings. Reduced to a concentrated form, the product is ready for the application of the various tests, and with each a neat reaction is obtainable.

Boiled with liquor potassæ (Moore's test), a deep brown coloration is induced.

Treated with a few drops of a solution of nitrate of bismuth and then a solution of potash or soda (Böttger's test), a white precipitate falls, which is turned black by undergoing reduction to the metallic state on boiling.

With the copper test (potassic tartrate of copper) it gives an immediate and copious deposit of yellow or orange-yellow reduced oxide. The reaction is such as to be perfectly unmistakable. Should it happen, however, that the ammonia employed in the process of extraction has not been thoroughly removed by washing, the reaction does not appear until after prolonged boiling, a result which may naturally be looked for under the circumstances, for the effect of the presence of ammonia and its salts is to interfere with the proper behaviour of the test, and until the ammonia has been in great part dissipated by heat the reduced oxide is not thrown down, although a change to a yellow or orange-yellow colour may have occurred. The presence of lime also interferes with the reaction of the copper test, a copious semi-gelatinous precipitate being thrown down. It is necessary, therefore, to secure that the animal charcoal used for decolorising has been thoroughly purified from lime. Under the employment of animal charcoal, purchased as pure, I have known a large quantity of lime to be taken up when the product has been left in an acid state as occurs after liberation from the lead compound by the action of the sulphuretted hydrogen.

When urine in its ordinary state gives a slight reaction with the copper test, there is the possibility that this reaction may be due to the lithic acid present, and especially should the sample of urine be one which is loaded with lithates, for

some reducing effect on oxide of copper is produced by lithic acid. In the product prepared by the lead process there can be no fallacy on the score of lithic acid reaction, the effect of the first addition of the acetate of lead to the urine being to throw down and get rid of all the lithic acid that was present.

Whilst the tests which have been referred to afford strong presumptive evidence by their reaction of the presence of sugar, yet without confirmation by the fermentation test it could not be considered that the proof required was supplied. It is to fermentation that we appeal for crucial evidence, and with an active and well-marked result nothing more conclusive could be desired. At starting I must confess I experienced considerable disappointment. For some time, I over and over again tried the fermentation test without obtaining any satisfactory evidence of the occurrence of fermentation. The copper test reacted so strongly and neatly that I could not understand the meaning of this result, and was loth to discredit the existence of sugar. Dr. Bence Jones had spoken in decided terms about obtaining unmistakable evidence of fermentation, and had estimated the carbonic acid evolved by weight. My own process of procedure was the same as that of Dr. Bence Jones, and yet the product failed to ferment. Whilst in this conflicting position I tried the process upon urine known to contain sugar, and still obtained, as will be seen below, a negative result.

One fluid drachm of diabetic urine containing 14 grains of sugar to the fluid ounce was mixed with a pint of normal urine. This was then treated by the lead process, and the lead compound decomposed with sulphuretted hydrogen. The product after evaporation to a small bulk was placed with washed German yeast in a fermentation tube, and exposed to a temperature of 110° Fahr. No fermentation occurred.

Two drachms, four drachms, and eight drachms of diabetic urine containing $8\frac{1}{2}$ grains of sugar to the fluid ounce were added to separate pints of healthy urine, so that the specimens contained respectively rather over 2, 4, and 8 grains of sugar. In neither case after subjection to the lead process could any fermentation be induced, notwithstanding the products gave a strong reaction with the copper test.

Two drachms, four drachms, and eight drachms of diabetic

urine containing 82 grains of sugar to the fluid ounce were added to separate half pints of normal urine, and the specimens treated by the lead process. Neither of the products underwent fermentation. To the contents of the tube representing the four drachms of diabetic urine, and corresponding, therefore, with 16 grains of diabetic sugar, 2 grains of grape sugar were added, and after exposure again to the appropriate heat no fermentation ensued. A portion of the yeast employed in the experiment was placed in contact with an aqueous solution of 1 grain of grape sugar, and exposed to warmth alongside the other tubes. An abundant evolution of carbonic acid gas occurring showed that there was no fault on the part of the yeast.

One pint of normal urine was treated by the lead process, and the product from the decomposition of the lead compound by sulphuretted hydrogen was divided into two equal portions. To one portion 10 grains of grape sugar and washed yeast were added, and to the other, washed yeast alone. A third tube containing an aqueous solution of 10 grains of grape sugar and yeast was placed alongside the other two. Active fermentation occurred in this, and nothing decided in the two others.

Sixty grains of grape sugar were dissolved in two fluid ounces, and another sixty grains in twenty-two fluid ounces of normal urine. Both samples were treated by the lead process, and the products placed in contact with similar quantities of yeast. That corresponding with the two ounces of urine underwent pretty brisk fermentation, but did not give rise to the evolution of so much gas as the contents of a companion tube containing an aqueous solution of 10 grains of grape sugar, whilst that representing the 60 grains of sugar in twenty-two ounces of urine remained in a quiescent state.

Three ounces, and one ounce and a half of diabetic urine, containing 80 grains of sugar to the ounce were taken separately, and without any admixture with other urine treated with the lead process. Both products exhibited evidence of active fermentation in contact with yeast.

From the above series of experiments it became perceptible that because no fermentation occurred it could not be taken as

proved that no sugar was present. Wherever a considerable quantity of urine was employed a negative result was obtained, notwithstanding a large quantity of sugar was started with, and, moreover, notwithstanding sugar may have been actually added to the test product. On the other hand, in the instances where the sugar was mixed with only a small quantity of urine, and where unmixed diabetic urine was subjected to examination—that is where the ordinary urinary products were present only to a small extent, fermentation occurred; hence the inference is to be drawn that something is derivable from the urine which interferes with the action of yeast in producing fermentation.

In attempting to find out the condition which opposed the action of the yeast, I noticed that the product was strongly acid, and tried the effect of bringing it to a neutral state before manipulating with it. I now found that fermentation readily and actively proceeded, and thus the discordancy between this and the other tests became reconciled.

With the product in my possession procured from healthy urine, I can now show a good reaction with all the tests I have referred to. At the meeting of the Royal Medical and Chirurgical Society of November 23rd, 1875, I exhibited a specimen of the product and applied the various tests before the Fellows present. Moore's test gave a dark brown coloration; the bismuth (Böttger's) test became black; the copper solution gave a copious precipitate of orange yellow reduced oxide, and the fermentation test acted briskly. The process of fermentation was allowed to proceed during the course of the meeting; and, at the end of the evening, the evolved gas was shown to consist of carbonic acid by the absorbing action of potash; and further, the fermented liquid was submitted to distillation and the distilled product allowed to fall into a solution of chromic acid in sulphuric acid, when the change to green indicative of the presence of alcohol was obtained. In this way a demonstration was given of the production of alcohol and carbonic acid, and it may be considered that incontestable evidence was afforded of the existence of sugar as a constituent of healthy urine.

In the application of the fermentation test, I at first followed the process adopted by Dr. Bence Jones, and esti-

mated the evolved carbonic acid by weighing. The product mixed with yeast was placed in a tube adapted with a chloride of calcium tube fixed into the cork, through which the carbonic acid was made to pass before escaping, in order that no moisture might be lost. By weighing before and afterwards, the evolved carbonic acid was estimated by the loss noticed. A small amount of carbonic acid, however, gives very little appreciable difference, and, although the precaution was



taken to coat the cork with sealing wax to render its surface impervious, the figures were not always in harmony with what was to have been expected from the conditions existing. I consider it far better to collect the carbonic acid and allow its volume to be seen, and the accompanying sketch represents the kind of apparatus I have devised for the purpose. It is constructed of two test-tubes about three inches in length each. The product to be tested mixed with yeast is placed in the lower tube and made to fill it to within half an inch of the cork. The other tube, after having been filled with water, is inverted and fixed as shown in the sketch. The piece of curved tubing, which during fermentation allows of the displacement of water as the carbonic acid is produced and rises, is provided

at its free end with vulcanized tubing and a glass plug which seals the opening and permits the tube to be inverted during adjustment without the water running out. When the two tubes are connected and arranged for use the glass plug is of course removed. The lower tube is immersed in a vessel of water, the temperature of which is maintained at about 110° Fahr. At this temperature, when the appropriate conditions exist for fermentation, a decided effect is very soon noticeable. By setting a companion tube going containing only the washed yeast and water, the experiment is rendered more conclusive.

Should it be desired to show that the gas evolved consists of carbonic acid, the glass plug must be re-introduced. The apparatus is then disconnected by removing the lower tube. The thumb placed over the open end of the straight piece of

tubing projecting below the lower cork admits, without any escape occurring, of the glass plug being removed, and the end of the bent tubing being immersed in a strong solution of potash. In this position a little heat applied by means of a spirit lamp to the tube containing the gas causes its expansion and a corresponding expulsion of contents from the interior. The subsequent contraction which ensues when cooling is allowed to occur leads to some of the solution of potash being drawn up into the tube; and as soon as this has taken place, a little agitation brings about a rapid absorption of the gas, and with it a filling of the tube with the potash solution.

To demonstrate the existence of alcohol in the fermented product, the contents of the lower tube are placed in a suitable apparatus for distillation on a small scale. A strong solution of bichromate of potash in sulphuric acid is then used as a test. The first few drops of the distillate are allowed to fall into this solution contained in a test tube inclined obliquely, so that they trickle down and float on the top. At the line of contact of the two liquids, a green colour is perceptible when alcohol is present from the reducing influence exerted, and then on shaking the two together a green colour pervades the whole, should enough alcohol exist; but where only a minute quantity is dealt with, the red colour of the test may overpower and obscure the green produced by the reaction. Under these circumstances it is desirable to use a diluted test solution, but the dilution must be effected with strong sulphuric acid and not with water. By using a pale bichromate of potash solution, the test is so delicate that it is possible to recognise the minute quantity of alcohol which is produced from the slight fermentation observed to occur in washed yeast without any addition besides water.

Hitherto I have only spoken of the recognition of sugar in healthy urine and have said nothing about the actual quantity present. It is a point of interest, however, after noting the fact of its presence that some information should be obtained regarding the amount that exists. Doubtless this is subject to constant variation, passing from the minutest quantity up to that which is distinctly recognisable by testing without any preliminary preparation. Such is the conclusion that may be arrived at from the evidence before us.

I agree with Dr. Bence Jones that a quantitative determination is best made by means of the copper solution. The fermentation test, whilst affording more conclusive evidence than any other applied qualitatively, is not a satisfactory agent for delicate quantitative purposes. Dr. Bence Jones gives five results obtained by the copper solution, and the actual amount of sugar indicated fluctuated between .924 and 2 grains in a litre (1½ pints roughly) of urine, but as he reckons that the process of preparation for testing involves a loss of one third of the sugar originally present, he estimates the real amount as having ranged between 1.38 and 3 grains. My own examination has given a concordant result. Six pints of healthy urine of sp. gr. 1015 were subjected to the lead process and care taken by freely washing the precipitates and the charcoal finally used for decolorisation to incur as little loss as possible. The amount of sugar indicated by the copper solution corresponded to 3.39 grains—that is, .565 grains to the pint.

The recognition of sugar as a constituent of healthy urine shows that there is no abrupt boundary line existing between health and disease. As is the condition of the blood in relation to sugar, so is that of the urine; in other words, the urine partakes of or represents the character of the blood as respects this principle. Observation shows that it is the natural state of the blood to contain a minute quantity of sugar. No matter from what part of the circulatory system the blood is collected, on being treated so as to get rid of its albuminous and colouring elements it yields a slight reaction with the copper solution. From such a state, the urine derives a slight saccharine impregnation, the sugar doubtless passing off by virtue of its physical tendency to diffuse. With an increased quantity of sugar in the circulatory system an increased amount is immediately visible in the urine. It does not signify whether it arises from an internal or an external source; that is, whether from some modified functional operation, or from an artificial injection into the circulation—let sugar exist to an increased extent in the blood, and the same will also be noticeable in the case of the urine.

Bernard speaks of the capacity of the circulation for tolerating the introduction of a certain amount of sugar

without its appearing in the urine. He goes so far as to give a sharp line to this tolerating capacity. He says the extreme limit of sugar which the blood can tolerate and retain is comprised between 2·24 and 2·60 grammes per 1000. It is about 2·50 grammes for a dog. The proportion of sugar contained in the blood may undergo oscillations, but if it do not surpass 2·50 grammes per 1000, it will not be shown by the urine. If, on the contrary, it should pass this limit, glycosuria manifests itself.¹ Nothing is said about the examination of the urine otherwise than by the rough and ordinary method, and it may be assumed that such was the process upon which the proposition enunciated is founded. Now, seeing that a negative reaction under the ordinary mode of testing is not to be taken as evidence that the urine is absolutely free from sugar, but simply that it does not exist in sufficient quantity for the test to reveal it, the statement should stand that when the proportion of sugar in the blood attains a certain point, it passes off with the urine in sufficient quantity to be recognisable by ordinary testing, whilst when below the given point the amount escaping is too small for the test to furnish a reaction. It is not an absolute question of presence or absence of sugar that has to be dealt with, but amount of sugar on the one hand within and on the other beyond the capacity of ordinary testing to reveal it. The hard line which has been drawn fails to have more than an apparent existence.

I regard the fact that sugar is susceptible of recognition in healthy urine as of the highest importance with reference to the glycogenic theory. It tells strongly against the validity of this doctrine. I strenuously contend that there is no active destruction of sugar carried on in any part of the circulatory system. If sugar reach the general circulation, whether from the liver or by artificial introduction from without, it is to be discovered in the blood in all parts of the system. Under natural circumstances, the blood contains only a minute proportion of sugar, and still from this minute proportion the urine acquires a recognisable saccharine impregnation. Such being the case, what, it may be asked, might be reasonably looked for if sugar were constantly being

¹ 'London Medical Record,' Nov. 12th, 1873, p. 707.

discharged from the liver as is maintained under the glyco-genic theory? Passing off as it does with the urine in correspondence with its entrance into the general circulation, the exercise of a glycogenic function by the liver would involve in proportion to its activity, a more or less highly saccharine condition of the urine—the condition, indeed, which actually exists in diabetes.

From a pathological as well as a physiological point of view the recognition of sugar as a constituent of healthy urine has a bearing of considerable importance. It enables us to reconcile ourselves to the instances in which sugar is incidentally met with to a moderate extent in the urine without being associated with any clinical significance. Every degree of variety is presented in the condition of the urine in relation to sugar, from the state belonging to health to that of confirmed diabetes. The two states are not separated from each other by a sharply defined line of demarcation. Sugar is encountered in the urine as one of the phenomena of idiopathic diabetes, but because sugar may happen to be encountered in the urine it does not follow that diabetes exists. Without the absolute production of what may be called a decided and neat reaction it is not at all uncommon in testing urine to find that a certain amount of reducing effect is produced upon the copper solution beyond what can be accounted for by the action of uric acid. In other, but rarer, instances sugar may be present to an unmistakable extent without having anything to do with diabetes. About a year back I was consulted by a lady, twenty-two years of age, for symptoms of renal colic. She brought a specimen of urine with her, and after examining it for albumen, from force of habit and without any special reason to lead me to do so, I tested it for sugar. To my surprise, for there was nothing in the history or condition of the patient in the slightest degree suggestive of diabetes, it gave a neat reaction of sugar, and on subsequently making a quantitative analysis I found that it contained 3·42 grains to the fluid ounce. When the patient visited me again ten days and six weeks afterwards, and brought, at my request, several samples of water, they all showed a negative behaviour with the copper test. No dietetic or other treatment for diabetes had been employed. A gentleman, about sixty years of age, came to

me suffering from a lichenoid eruption. In order to complete my investigation of his case, I desired that some urine should be passed in my consulting-room. On analysis I found that it contained 2.55 grains of sugar to the fluid ounce. I examined the urine of the patient again upon two occasions afterwards, and each time without finding any sugar. No diabetic treatment had been adopted. Quite recently I was called upon to advise in a complicated case, attended with great debility, and nothing suggestive of diabetes. The urine contained 4.44 grains of sugar to the fluid ounce; and a few days later, without any diabetic restriction in diet, 2.18 grains to the fluid ounce. Between this kind of condition, where the presence of sugar has no clinical significance, and that belonging to confirmed diabetes, every intermediate degree of glycosuric state may be encountered. With such facts before us, it is evident that a broad view requires to be taken with respect to treatment. Each case must be allowed to stand upon its own merits, and be treated according to the precise condition existing.

NOTE ON THE USE OF CHLORAL

FOR

THE PRESERVATION OF SUBJECTS AND ANATOMICAL PREPARATIONS.

By H. G. HOWSE, M.S.

SOME three or four years ago, I was shown by a continental preserver a portion of a subject which, I understood, had been injected with chloral. It was mummified, but otherwise perfectly preserved. The very considerable expense of chloral at that time made me regard the subject more as a matter of scientific curiosity than in any other way. I did not then think that it would ever come to be used commonly as a preservative for subjects for dissection.

Last summer, however, I received from Dr. W. W. Keen, of Philadelphia, U.S.A., a copy of his pamphlet on this subject, reprinted from the 'American Journal of Medical Sciences for July,' 1875. Finding that he had used it rather extensively, and that he spoke of it favorably, I determined to give it a serious trial, thinking that, if it did away with the use of glycerine in our injections, we should avoid the translucency which this material always gives the tissues, into which it is injected. Four subjects were accordingly injected with a watery solution of chloral, and at first I was inclined to regard the results favorably. But a more prolonged trial finally com-

pelled me to yield to the loudly expressed opinion of the demonstrators of anatomy and of the students in the dissecting room, that it was, as a preservative, vastly inferior to the method which I introduced some years ago, and which has been detailed in previous numbers of these Reports.

The first subject was injected with half a pound of chloral in about six pints of water. This was preserved fairly well, and, at the end of the dissection, six weeks after being brought into the room, was about in the same condition as if injected with the old preservative, viz., a watery solution of arsenite of soda. It was certainly not so good at that time as a glycerine subject would have been. But, on the other hand, the translucency of the tissues had been absent, and the result encouraged me to try the smaller quantity mentioned by Dr. Keen, viz., a quarter of a pound of chloral. Two subjects were consequently injected with this quantity, with four pints of water. Both these subjects were good and fresh at the time they were received, but in both the result was in the highest degree disastrous. A slight smell of chloral was perceptible about them for the first few days, but at the end of a fortnight they had both become terribly decomposed, and maggots bred quite freely in them, so that most of the dissectors gave up work at their parts. The fourth subject was one which I had for lecturing upon, and which was, consequently, under my immediate attention for some weeks. It was a capital muscular male, without any undue amount of adipose tissue. Mindful of our last experiences, it was injected with a pound of chloral in about six pints of water. With the injection we threw in about six drachms each of oil of citronelle and clove, to see to what extent they perfumed the tissues. Scarcely any odour of the essential oils was perceptible, however, during dissection. This subject was preserved moderately well, but before the end of six weeks it had got green about the legs and arms. We thought that it had not done as well as if injected with the old watery solution of arsenite of soda, and at that period it was of course vastly inferior to the glycerine subjects. This was our last experiment. We did not think that the results of our trials were sufficiently satisfactory to justify our repeating them, especially as subjects were very scarce last winter.

Comparing the expense of the chloral with our own injection, we found the advantage was rather with our own. We obtained the chloral at 5s. a pound. This was the best quality, such as we use in medicine. We could not get any cheap, brown, damaged article, such as that spoken of by Dr. Keen. A quarter of a pound of chloral was evidently utterly untrustworthy for our subjects. Half a pound was the smallest quantity that we could reckon on, and even that not with complete confidence. This amount would cost 2s. 6d. In our injection the chief expense is in the glycerine, the soda and arsenic merely costing two or three pence. All our *winter* subjects are injected with from two to four pints of glycerine, the former if the subject is a good one, the latter if it is rather decomposed when received. Even putting the cost of the glycerine at 6d. a pint, and estimating four pints to be always used, we shall have a cost of only 2s. 3d. per subject for the preservative, and this is taking everything at extremes. Of course I am now speaking only of *winter* subjects. In our summer dissections, which have to last six months through the hot weather, we inject, at intervals, the full quantity of glycerine mentioned in my paper, viz. two gallons, and this makes the expense much greater. But it is quite clear that chloral, even when used in large quantity, will never be a trustworthy preservative for summer dissections in this climate.

It is difficult to account for the difference in these results and those arrived at by Dr. Keen. I may say that in each experiment I weighed out the quantities of chloral myself, saw the solution made and injected, so that no mistake could possibly have arisen in that way. Our average winter temperature in this country, however, is very much higher than in America, and it is possible that the greater dampness and general mugginess of our air as compared with the dry, keen atmosphere of the American Continent may make it more difficult to preserve subjects here than it is there. It is only fair to Dr. Keen to add that, in an appendix to his paper, he gives the details of two subjects injected for summer use, in which the results were not so satisfactory as the first trials had been.

For other things, chloral is undoubtedly a valuable pre-

servative agent. I have used it with the best results for pathological preparations, and for preserving urine and other fluids, which I wished to keep as much as possible unaltered. For urine I generally use about ten grains to an ounce, and for solid preparations a solution of double this strength. The latter should not be in too large mass, otherwise the chloral solution does not penetrate to their interior before putrefactive softening has set in. For small preparations and for fluids, it is, however, a valuable addition to our stock of preservative agents.

STATISTICAL ANALYSIS
OF THE
PATIENTS TREATED IN GUY'S HOSPITAL
DURING THE YEAR 1875.

By J. C. STEELE, M.D.

THE following brief summary of the patients relieved at the hospital during the past year has been drawn up with the view of continuing the annual series of statistics inserted in former numbers of the 'Reports.' It will be seen on reference to the retrospective summary attached to the tables that the number of patients under treatment in the hospital during the year has exceeded that of any previous year, while the number of out-patients has undergone a sensible and desirable diminution.

The total number under treatment in the wards amounted to 5854, of which 5285 were treated to a termination, that is to say, were either discharged from or died in the hospital, while the remaining number 569 continued their residence till the present year, and will be dealt with in the returns for 1876. On comparing these figures with the relative numbers for preceding years there are several circumstances worthy of notice. The first of these is the increase already referred to which exceeds the corresponding return for 1874 by 78, and the average number for the preceding ten years by 376. When examined more closely the accessional numbers may be mainly traced to the extended accommodation afforded to

medical patients since the opening of the new wards in 1872, which has been the means of raising the relative number of medical cases from 37 per cent. to 43 per cent. of the total admissions. Partly as a consequence of this augmentation, the number of persons daily resident throughout the year has been somewhat higher than has been noticed in previous summaries. This average taken for each day of the year has amounted to 560, or 44 in excess of the corresponding average of the ten years preceding, and would have been greatly in excess of that number, had the mean residence of the patients maintained the same ratio as it has done for several years antecedent to 1875. The average stay has amounted to 37·32 days—that of the medical cases to 37·12, and that of the surgical cases to 37·48 days; and though collectively still high in comparison with the experience of other hospitals it is noticed to be less than it has been since 1870, being one day less than in 1874, and two days less than it was in 1873. The progressive limitation is mainly attributable to the shorter stay of the surgical cases which was formerly abnormally high in consequence of the large number of cases of diseased joints which had undergone excision or had been subjected to a lengthened period of rest in the hospital. In estimating the amount of relief afforded by the residence it has been customary in most hospitals to indicate the results by the terms cured, relieved, unrelieved, and dead. These are tangible results, and if uniformity could be ensured by hospital registrars in dealing with the returns, there can be no doubt that a classification based on these several issues would be best adapted for purposes of statistical comparison, but it is to be feared that the latitude embraced by the terms cured and relieved will render nugatory any attempt to deduce practical information therefrom. The term cured must always be accepted within certain circumscribed limits, and to solve the difficulty it would appear almost better as has been done by the surgical registrar during the past year to comprise almost all the cases under the one heading of relieved. With respect to the class marked unrelieved or incurable there can be little room for doubt. These form annually from 8 to 9 per cent. of the cases discharged from the hospital. Their ultimate destiny is not very clear, although many find a last refuge in the workhouse infirmary, while a

considerable number migrate to other hospitals in hopes of that relief which they find so difficult to obtain.

The deaths in the hospital amounted during the year to 560, or 10·60 per cent. of all the cases where a definite result was obtained. This mortality though less by 34 than the corresponding return for 1874 is considerably above the usual average, and is 53 in excess of the mean mortality of the last ten years. When examined more in detail the death rate among medical cases is seen to average 16 per cent., and among surgical cases 6·55 per cent. of the practice of the year. These rates form a fair estimate of the mortality which has obtained in the two main departments of the hospital for many years past, and although the collective mortality may have been slightly increased in consequence of a somewhat larger addition having been made to the medical than was carried out in the surgical division, there have been no accidental circumstances occurring which would in any way materially interfere with the relative mortality of either class of patients. In addition to the deaths occurring within the hospital, 21 persons were brought in dead by the police or by their friends: some of the number had met their death by accident, but the majority had been picked up in the streets in a moribund condition. It may be noticed that of the above number of deaths 518 underwent post-mortem examination in accordance with the regulations of the hospital on this subject.

Although the practice followed for many years past of rigidly excluding cases of the more infectious disorders from the hospital has had the effect of keeping the wards free from any outbreak of imported disease among the patients, yet the unusual prevalence of any epidemic in the Metropolis is sure to express itself either by the admission from time to time of doubtful cases of the malady, or by its appearance among patients who may be admitted with other affections. In the course of the year 12 cases of scarlet fever are entered as having occurred, and among these were two sisters and a house-surgeon who had evidently contracted the disease within the hospital. Eight of the cases referred to were at once removed to the Stockwell Fever Hospital, while the others were isolated in separate rooms of the building. Since the establishment of

the district hospitals for contagious diseases by the Local Government Board, increased facilities have been afforded to the general hospitals for dealing with this class of patients, but it is at the same time a question whether it is expedient to transport these persons, the majority of whom have never been indebted to parish relief, to hospitals supported by government rates. Alive to the consequences of this evil the authorities of the London Fever Hospital have consented to forego their usual fees and to receive into their establishment in the Liverpool Road such cases of contagious fever as may occur in the practice of the general hospitals, and it is needless to say that this privilege will be gratefully taken advantage of in future.

Although on the principle of segregation, almost complete immunity from disease contracted in hospital may be preserved among the medical patients, it is practically impossible to carry out similar enactments among surgical patients without depriving the department of half its usefulness. In every curative establishment where the system of admission is based on the gravity of the cases, a considerable portion of the selected must present features of an offensive or septic character, which in spite of the best known precautions are prone to produce a deleterious influence on their surroundings. This subject has been so frequently referred to in nearly all hospital Reports, that it is scarcely necessary to advert to it here, further than to notify the extension during the year of the accommodation for females suffering from erysipelatous and offensive wounds. The evil, so far as the male patients were concerned, had been to a certain extent met by their isolation in a separate division of the male venereal ward on the upper floor of the old building, but it was not till the spring of the past year that adequate accommodation was procured for females by adapting a corresponding portion of the female venereal ward to this purpose. The greater liability of the former sex to septic disease of a traumatic origin is shown by the larger number of patients received into the male ward during the year, than there were into that allotted for females. The total number received into the former amounted to 98, of which only 38 were removed from the ordinary surgical wards where they had either contracted some contagious affection,

or were admitted with their wounds in an unhealthy condition, while 55 came direct from their own homes. Of the cases transferred from the wards, several of whom had undergone operations of critical importance, 9 died, and of the others 5 died. Since the opening of the division for females, on the 1st of May, the total number of cases of septic disease has not exceeded 20, and during the last four months of the year no patient suffering from erysipelas has been received into the ward. During the interval the ward has been mainly employed for the isolation of burns and other cases of an offensive nature which it was deemed expedient to remove from the ordinary wards.

Of the numerous surgical cases under treatment 928 or 28 per cent. of the whole suffered from injuries. Of this number 95 or a fraction over 10 per cent. died, and as it has been already shown how the death rate among the ordinary surgical cases rarely exceeds $6\frac{1}{4}$ per cent., it is evident that the accident element forms the main factor in raising the mortality of the department. The number of accidents received during the year exceeded by 70 the corresponding return for 1874, and is considerably above the average of the last few years; while the fatal results are less numerous than in 1874, but taking an average of the last ten years are somewhat greater in proportion to the annual numbers treated. The causes originating the accidents are set forth in the Accident Table, from which it may be seen that burns and scalds form the most fatal class of injuries received, the death rate among this class having amounted to 39 per cent. It ought to be kept in view, however, that for one case of burn or scald admitted, as many as 20 are attended to in the surgery, the cases admitted being always of the most severe character, and from their prolonged residence coupled with the extent of open surface wounds which they present, these injuries must always be the cause of serious apprehension to the satisfactory progress of other patients in surgical wards. It has been found necessary in consequence to restrict, perhaps to a greater extent than in any other class of patients, the admission of such accidents, and to admit those only to whom danger might be apprehended from conveyance to and from the hospital for the purposes of treatment. Falls, including

such as have been sustained from heights, as from scaffolding or downstairs, or simply on the ground when walking or running, form numerically nearly one half of all the accidents received. A large proportion of these consists of fractured limbs, where the probability of recovery is great, the mortality among them being seldom higher than 7 per cent. In this respect these injuries show a marked contrast to such as arise from railway collisions, burns and scalds, or even from street vehicles, in which latter case the mortality runs from 15 to 20 per cent.

The number of surgical operations registered considerably exceeds 500, but as many of these were simply of an exploratory character, or were repetitions of the same operation, and not a few consisted of tapping, injecting or incising cysts and abscesses, the total number tabulated has been reduced to 452, of which 75 ended fatally. The table of limb amputations comprises 67 cases, of which 45 recovered, 2 of the recoveries being the only instances of multiple amputations which occurred during the year. The minor amputations of fingers and toes have been classified among the ordinary or miscellaneous operations. Among the more important operations, there has been rather a falling off in the number of cases of resection of joints, in comparison with the preceding year, although the operation has been performed 23 times. Herniotomy has been practised in 23 cases with 15 recoveries; ovariectomy in ten cases with 6 recoveries, and lithotomy has been performed 8 times with 6 recoveries. From the table it would appear that the galvanic cautery had been employed only on 23 occasions for operative purposes, but from a return furnished by the electrician it seems that the battery has been charged 75 times, and that 114 operations have been performed through its agency. As many of these were performed on out-patients for *nævi* and other excrescences, and as many more were repetitions, they have not been inserted in the register. Irrespective of the cautery, the electrician reports that 13 operations have been performed by means of electrolysis, and that he has employed galvanism as a medical agent 4005 times during the year. The table intended to present a summary of the ophthalmic operations, although it gives a fair notion of the work

done in the department, is imperfect from its failing to specify in more than a moiety of the cases, the practical results of the operations.

The number of out-patients who have received relief in their department has amounted to 75,804, of which 12,922 may be reckoned as the number of out-patients in the proper sense of the term, as their orders entitled them to a continuous attendance of two months. The total number shows a considerable decrease from the return of 1874, depending mainly on a diminution in the number of minor surgical cases, which class for some years prior to that under review had been greatly on the increase. The report of the Lying-in Charity refers to a total of 2334 women confined at their own residences during the year. The area covered by the charity was somewhat circumscribed during the term, and the curtailment has had the effect of diminishing the number relieved by 112 in comparison with the return of the preceding year. During the two years preceding 1875, the maternity deaths were considerably above the average rate, but in the course of the past year they were reduced to 9 or a fraction under 4 per 1000.

1.—Tabular Statement of the Number of In-door Patients received into the Hospital during the Year, with Results of Treatment.

Remaining in Hospital 1st January, 1875.	569
Admitted during 1875	5,285
Total under treatment	5,854

Discharged as cured	854
Relieved	3,452
Unrelieved	419
Died	560
Remaining in Hospital 1st January, 1876.	569
	5,854

Average number daily resident throughout the year . . . 559

Mean residence of each, in days, 37·32.

Rate of mortality over all the cases, 10·60 per cent. { Males, 12·38 per cent.
Females, 8·14 „

MEDICAL WARDS.		SURGICAL WARDS.	
Remaining 1st January, 1875	236	Remaining 1st January, 1875	333
Admitted during the year	2,280	Admitted during the year	3,005
Total	2,516	Total	3,338
Discharged cured.	732	Discharged cured	122
Relieved	970	Relieved	2,482
Unrelieved	200	Unrelieved	219
Died	362	Died	198
Remaining 1st January, 1876	252	Remaining 1st January, 1876	317
	2,516		3,338
Average number daily	238	Daily number resident	321
Mean residence of each	37·12 days.	Mean residence of each	37·48 days.
Rate of mortality, 15·98 per cent.	{ M. 20·49 F. 11·40	Rate of mortality, 6·55 per cent.	{ M. 7·56 F. 4·80

Causes of the various Accidents admitted in 1875, with the Mortality attending thereon.

CAUSES OF THE ACCIDENTS.	Total cases.	Discharged.		Died.		Remaining.	
		M.	F.	M.	F.	M.	F.
Accidents on the river	21	17	...	1	...	3	...
Assaults	56	40	13	2	...	1	...
Attempts at suicide, excluding poison . .	14	8	4	1	1	...	...
Kicks and bites from animals	16	15	...	1	...	...	...
Burns from clothes taking fire	26	2	8	4	7	1	4
" heated fluids	25	10	5	5	2	2	1
" explosion of gas	4	3	1	...	...	...	...
" explosion of gunpowder	2	1	...	1	...	...	...
Collisions between opposing forces	20	14	3	2	...	1	...
" with street vehicles	121	77	22	15	3	4	...
Cuts and blows from sharp instruments . .	44	26	13	1	2	2	...
Falls down stairs	51	11	30	2	2	3	3
" from a height	178	137	14	13	...	13	1
" on the ground	179	120	31	7	2	12	7
" of heavy weights	65	55	4	4	...	2	...
Foreign bodies in internal passages	13	10	2	1	...	...	...
Gun-shot wounds	4	2	1	...	...	1	...
Machinery accidents	29	19	2	2	1	5	...
Poisoning, accidental	6	4	2	...	...	...	...
" intentional	4	...	4	...	...	...	...
Railway accidents	37	20	2	11	...	4	...
Torsions of body	13	10	1	1	1	...	...
Total	928	601	162	74	21	54	16

Surgical Operations, exclusive of Limb Amputations and Ophthalmic Cases, 1875.

	Cured or relieved.		Unrelieved.		Dead.		FATAL COMPLICATIONS.	REMARKS.
	M.	F.	M.	F.	M.	F.		
<i>Excision of Diseased Parts—</i>								
Cancerous mamma . . .	...	22	...	...	...	2	Pyæmia, embolism	...
Adenoid tumour. . .	...	5	...	...	...	...	...	...
Other mammary tumours . . .	...	2	...	...	...	...	...	...
Cancer of jaw . . .	1	...	1	...	...	...	...	Encysted 2.
" lip . . .	7	...	2	...	...	...	...	...
" tongue. . .	2	1	...	...	...	...	...	...
" other parts . . .	5	4	...	2	4	...	Pyæmia 3, Erysipelas 1	Vulva 1, neck 3, axilla 1, groin 2, skin 8.
<i>Other tumours—</i>								
Fibrous tumours . . .	4	1	...	...	...	...	...	Thigh, axilla, hip.
Fatty " . . .	4	4	...	...	...	...	...	Back 4, neck 2, thigh and knee.
Encysted " . . .	...	2	...	...	...	1	Broncho-pneumonia	Forehead, mouth and jaw.
Papilloma . . .	1	...	...	...	...	...	Erysipelas	Heel.
Lymphoma . . .	...	...	...	...	1	...	...	Neck.
Bursal tumours . . .	...	5	...	...	...	...	...	Knee.
Melanotic " . . .	...	1	...	...	...	...	...	Hand.
Epulis . . .	...	5	...	...	...	...	...	Parotid, jaw.
Enchondroma . . .	1	1	...	...	...	...	...	...
Excision of nevus . . .	3	...	...	...	...	...	...	Face 2, shoulder 1.

Surgical Operations, exclusive of Limb Amputations and Ophthalmic Cases, 1875—continued.

	Cured or relieved.		Unrelieved.		Dead.		FATAL COMPLICATIONS.	REMARKS.
	M.	F.	M.	F.	M.	F.		
<i>Galemic Cavity Operations (continued)</i>								
For cancer of tongue . . .	1	...	...	...	...	1	Pleurisy ...	
" " anus . . .	...	1	...	...	...	...	Nephritis ...	
" " scrotum . . .	...	...	...	...	1	...	...
" " nevus . . .	2	3	...	...	...	...	...
" " hemorrhoids . . .	1	3	...	...	...	...	...
" " other tumours . . .	3	2	...	...	...	...	...
Extraction of foreign bodies . . .	1	1	...	...	...	...	...	Vascular growths, urethra, hand, arm, and scrotum.
Removal of exostosis . . .	4	...	...	...	...	...	...	Needle, bullet.
Circumcision . . .	6	...	...	...	1	...	...	Tibia, finger, femur.
Perineal section . . .	14	...	...	...	7	...	Pyæmia ...	Phymosis, stricture, adherent prepuce.
Urethrotomy . . .	3	...	...	...	...	...	Pyæmia 3, peritonitis 2 ...	
Lithotomy . . .	6	...	...	...	2	...	...	Stricture 2, calculus.
Lithotripsy . . .	1	...	...	...	...	...	...	Vesical calculus.
Ovariectomy . . .	...	6	...	...	...	...	...
Tracheotomy . . .	...	2	...	...	2	4	...	Pneumonia, croup.
Colotomy . . .	...	...	...	...	2	...	Cancer of intestine	
Trephining . . .	1	1	...	...	4	...	...	Meningitis, compound fracture, &c.
Herniotomy—								
Umbilical . . .	...	1	...	...	...	1	Peritonitis	Opening sac.
Inguinal . . .	2	...	...	...	4	...	...	" "
" . . .	2	...	...	...	...	...	...	Sac not opened.
Femoral . . .	1	9	...	...	...	3	...	Sac opened.
Ligature of femoral artery . . .	...	...	...	...	1	...	Gangrene and pneumonia	Aneurism.

Table of the Larger Amputations, 1875.

	Ages of cured.		Ages of deaths.		Total M. and F.	Cured.		Died.		FATAL COMPLICATIONS.
	Males.	Females.	Males.	Females.		M.	F.	M.	F.	
<i>Amputation—Primary, for Injury—</i>										
of both legs . . .	18	...	...	...	1	1	...	...	...
of thigh and forearm . .	19	...	...	...	1	1	...	...	...
at hip-joint . . .	...	...	5	...	1	...	...	1	...	Shock from accident.
of thigh . . .	6, 25, 49	9	51	1½	6	3	1	1	1	Pymia 1, shock 1.
at knee-joint . . .	{ 12, 16, 16, 27	...	...	61	5	4	...	...	1	Pymia.
of leg . . .	...	23	23, 48	...	3	...	1	2	...	Shock, hæmorrhage.
of foot . . .	45	...	...	...	1	1	...	...	...
at shoulder-joint . . .	14	...	...	...	1	1	...	...	...
through humerus . . .	{ 9, 13, 14, 17, 17, 19	...	46	...	8	7	...	1	...	Exhaustion.
at elbow-joint . . .	18	...	...	...	1	1	...	...	...
through forearm . . .	35	...	...	...	1	1	...	...	...
<i>Amputation—Secondary, for Injury—</i>										
of thigh . . .	...	43	9	...	1	...	...	1	...	Pymia.
of leg . . .	...	...	40	65	3	...	1	1	1	Gangrene, fatty organs.
<i>Amputation for Disease—</i>										
at hip-joint . . .	7, 14, 23	...	55	...	4	3	...	1	...	Cancer, shock.

		4, 7, 10, 9, 23, 27, 46, 11, 24, 68	10	...	4	3	3	Pyæmia 3, cancer of lung 1, gangrene 1. Fibroid disease of lung. Pneumonia. Pneumonia. Cancer, shock. Pneumonia.
"	of thigh . . .	...	...	...	...	...	...
"	through knee-joint . . .	46	30	2	1	1	3	
"	through leg . . .	11, 19, 22	32	5	3	1	...	
"	through ankle-joint . . .	25	...	1	...	...	...
"	of part of foot . . .	22, 25	60	3	2	...	...
"	of arm and scapula . . .	...	...	1	...	...	...
"	through shoulder-joint . . .	...	...	1	...	...	1	
"	through humerus . . .	9	...	1	...	...	...
"	through forearm . . .	52	...	2	1	...	...
"	of part of hand . . .	10, 26	...	2	...	...	...
Total . . .		...	...	34	11	15	7	
			67					

Operations on the Eye.

(Compiled by Mr. MORGAN, Ophthalmic Assistant.)

OPERATIONS.	EYE.			RESULT.			TOTAL. Operations.
	Right.	Left.	Both.	Cured.	Im- proved.	Not stated.	
Removal of sebaceous cyst from orbit . . .	4	...	...	2	...	2	4
Stretching of supra and infra-orbital nerves for neuralgia . . .	...	1	...	1	...	...	1
EYELIDS—							
Ectropion . . .	4	3	2	2	...	9	11
Entropion . . .	6	3	1	...	...	11	11
Enlargement of palpebral aperture . . .	5	2	...	1	...	6	7
Closure of ditto . . .	1	...	...	...	...	1	1
Trichiasis . . .	5	2	1	...	...	9	9
Pterygium . . .	2	1	...	1	...	2	3
Removal of granular growth after lime . . .	1	3	...	2	...	2	4
LACHRYMAL APPARATUS—							
Opening lachrymal sac . . .	1	...	...	1	...	...	1
EXTERNAL MUSCLES OF EYEBALL—							
Operation for convergent strabismus . . .	13	29	23	19	...	69	88
Operation for divergent strabismus . . .	1	4	3	1	...	10	11
CORNEA—							
Removal of opacity by tinting . . .	8	5	...	...	13	...	13
Removal of cyst . . .	1	...	...	...	...	1	1
SCLEROTIC—							
Sclerotic incision for glaucoma . . .	7	9	2	2	...	18	20
IRIS—							
Iridectomy for artificial pupil . . .	84	67	51	19	9	225	253
Iridectomy for glaucoma . . .	4	6	2	...	...	14	14
Removal of entire iris . . .	5	2	1	...	...	9	9
Iridectomy for ulceration and threatening perforation of cornea . . .	4	1	1	...	...	7	7
EYEBALL—							
Operation for staphyloma . . .	...	1	...	...	...	1	1
Abscission . . .	3	2	...	...	...	5	5
Excision . . .	16	10	...	2	...	24	26

Operations on the Eye—continued.

OPERATIONS.	EYE.			RESULT.			TOTAL. Operations.
	Right.	Left.	Both.	Cured.	Im- proved.	Not stated.	
CRYSTALLINE LENS—							
Iridectomy extraction .	28	18	...	19	4	23	46
Common extraction .	19	17	3	4	...	38	42
Oblique corneal section .	5	4	1	4	...	7	11
Suction .	2	1	...	1	...	2	3
Needle operation .	3	3	2	1	...	9	10
Removal of opaque cap- sule .	5	4	4	1	1	15	17
Removal of displaced lens from vitreous humour	2	...	...	...	...	2	2
	232	198	97	83	27	521	631

Many more operations have been performed during the year, but having been done on out-patients, were not recorded in the book.

Minor operations, such as slitting up canaliculi, removing tarsal tumours, &c. are not recorded.

The imperfect registration of results is due to the fact, that most of those operated on are either at the time out-patients or become so shortly after the operation.

The operations on both eyes are considered as two operations.

OUT-PATIENT DEPARTMENT, 1875.

The following numbers comprise such patients as were furnished with cards and prescription papers to enable them to continue their attendance at the Hospital for a period of eight weeks:—

	Males.	Females.	Total.
Ordinary medical cases .	1,584	1,403	2,987
Ordinary surgical cases .	1,774	1,539	3,313
Diseases peculiar to women .	...	1,745	1,745
Diseases of the eyes .	1,261	1,456	2,717
Diseases of the skin .	548	522	1,170
Diseases of the ear .	536	454	990
	5,703	7,219	12,922

Besides the above number of registered cases there were prescribed for, in the rooms devoted to the out-patients, by the house-physicians and surgical dressers under the supervision of the staff:—

	Males.	Females.	Total.
Medical cases .	2,886	4,257	7,143
Surgical cases .	21,381	19,982	41,363

The number of minor accidents and other urgent cases attended to in the surgery by the house-surgeons and dressers was 9,764—of which 7,701 were men, and 2,063 were women and children.

The dental cases attended to in the surgery were 2,278, of which 1,021 were males and 1,257 were females.

The number of women confined and attended by the obstetric residents and students was 2,334.

DETAILS OF MIDWIFERY DEPARTMENT.

Number of women confined during the year	2,334
Number of single births, 2,310 ; twin births, 24. Total children .	2,358
Living male children	1,193
Living female children	1,075
Stillborn male „	56
Stillborn female „	34
	<hr/> 2,358

Of the 2,358 children, 2,285 were vertex presentations, 33 were breech, 9 were face, 16 were footling, 11 were hand and arm, 2 were cases of placenta prævia, and 2 were funis presentations.

Version was had recourse to in 5 cases, the forceps in 16, perforation with extraction in 2, and transfusion was employed in 3 cases.

Among the mothers there were 9 deaths reported from the following causes :—
From puerperal peritonitis, 3 ; from hæmorrhage after delivery, 4 ; from ruptured uterus, 1 ; from exhaustion after craniotomy, 1.

Among the mothers there were in their

1st confinement	312	Brought forward	2,180
2nd „	333	10th confinement	62
3rd „	302	11th „	43
4th „	309	12th „	27
5th „	275	13th „	15
6th „	225	14th „	4
7th „	179	15th „	2
8th „	146	19th „	1
9th „	99		
	<hr/> 2,180	Total	<hr/> 2,334

**RETROSPECTIVE SUMMARY OF PATIENTS RELIEVED DURING
THE YEAR 1875.**

	Male.		Female.		Total.
Patients under treatment in the wards .	3,360	...	2,494	...	5,854
Out-patients—Surgical, ordinary .	1,774	...	1,539	...	3,313
„ Medical, ordinary .	1,584	...	1,403	...	2,987
„ Diseases of women .	...	...	1,745	...	1,745
„ Diseases of the eyes .	1,261	...	1,456	...	2,717
„ Diseases of the ear .	536	...	454	...	990
„ Diseases of the skin .	548	...	622	...	1,170
„ Medical, casual, or slight cases	2,886	...	4,257	...	7,143
„ Surgical, casual, or slight cases	21,381	...	19,982	...	41,363
„ Minor accidents or other surgery cases . .	7,701	...	2,063	...	9,764
„ Tooth extractions . .	1,021	...	1,257	...	2,278
„ Midwifery patients . .	...	...	2,334	...	2,334
Total	42,052	...	39,606	...	81,658

Retrospective Summary of all the Patients Treated in Guy's Hospital since 1866.

	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
IN-PATIENTS.										
Under treatment during the year	5,510	5,245	5,297	5,164	5,123	5,549	5,828	5,571	5,776	5,854
Discharged well or convalescent	2,389	2,109	2,237	1,682	1,673	1,832	1,741	1,400	1,354	854
Relieved	1,515	1,532	1,551	2,047	2,057	2,203	2,634	2,749	2,925	3,452
Unrelieved	390	483	411	470	396	422	451	341	334	419
Discharged for special reasons.	189	146	116	...	...	...	...	...	...	...
Died	534	509	466	496	498	555	471	524	594	560
Rate of mortality per cent.	10.64	10.65	9.72	10.56	10.76	11.07	8.89	10.44	11.40	10.60
Average number daily resident	496	502	498	487	486	529	556	558	550	559
Mean residence of each in days	32.85	34.93	34.31	34.42	36.92	37.58	37.73	39.88	38.68	37.32
Number of accident cases admitted	907	911	805	788	821	892	938	885	852	928
Number of deaths from accident	97	101	83	76	91	85	66	85	102	95
Number of ordinary operations registered	342	362	417	314	345	316	309	350	540	452
Number of deaths after operations	60	69	70	51	63	76	60	73	104	75
Number of ophthalmic operations	606	638	624	499	441	678	722	671	470	631
OUT-PATIENTS.										
Surgical cases	3,807	4,125	3,905	3,655	3,350	3,883	3,813	3,681	3,801	3,313
Medical cases	3,129	3,438	3,456	3,380	3,330	3,216	3,132	3,126	2,919	2,987
Diseases of the eyes	2,461	2,914	3,614	3,775	3,580	3,657	3,392	3,356	3,083	2,717
Diseases peculiar to women	1,703	1,736	1,675	1,708	1,827	1,740	1,719	1,719	1,644	1,745
Diseases of the skin	684	801	1,048	1,047	1,055	1,089	1,034	994	989	1,170
Diseases of the ear.	731	757	960	913	929	1,262	1,467	1,332	1,089	990
Casual or minor medical cases.	10,045	10,414	10,679	11,152	11,086	10,416	10,308	8,532	7,042	7,143
Casual or minor surgical cases.	32,827	37,985	41,159	38,820	38,134	37,797	39,135	41,670	43,573	41,363
Tooth extractions	5,141	4,748	3,655	1,976	2,689	1,955	2,330	2,204	3,758	2,278
Minor accidents	6,030	6,444	6,390	7,319	8,585	5,804	7,506	10,770	14,746	9,764
Women confined at their own homes	1,586	1,727	1,783	1,929	2,183	2,240	2,518	2,213	2,449	2,334
Number of deaths after confinement	3	4	8	5	10	8	7	16	17	9

L I S T
OF
GENTLEMEN EDUCATED AT GUY'S HOSPITAL
WHO HAVE PASSED THE
EXAMINATIONS OF THE SEVERAL UNIVERSITIES, COLLEGES,
&c., &c.,
IN THE YEAR 1875.

University of Oxford.

First Examination for the degree of Bachelor of Medicine.

G. A. Wright, B.A.

University of Cambridge.

Second Examination for the degree of Bachelor of Medicine.

T. Duke, M.A.

|

G. T. Bettany.

University of London.

Examination for the degree of Doctor of Medicine.

Thos. Eastes.

Obtained the Gold Medal.

Logic and Moral Philosophy only.

James A. Rigby.

454 *Gentlemen admitted to Degrees, &c., in the year 1875.*

Final Examination for the degree of Bachelor of Medicine.

First Division.

H. Hetley.

Obtained First-Class Honours in Forensic Medicine, and Honours in Medicine and Obstetric Medicine.

Second Division.

A. Buchanan.

Obtained Honours in Obstetric Medicine.

E. B. L. Orespin.

F. J. M. Palmer.

First Examination for the degree of Bachelor of Medicine.

Second Division.

L. H. Stevenson.

Obtained Honours in Physiology, Histology, and Comparative Anatomy.

H. Davy.

M. Lubbock.

P. Horrocks.

E. H. Paddison.

Physiology only.

Second Division.

H. L. Champneys.

A. Finch.

Preliminary Scientific M.B. Examination.

First Division.

W. B. Hinton.

Obtained Honours in Chemistry.

E. Penny.

Obtained Honours in Zoology.

G. H. Russell.

Obtained Honours in Zoology and in Botany.

A. M. Turner.

Obtained Honours in Botany.

W. H. White.

Obtained Honours in Zoology.

L. C. Wooldridge.

Obtained the Exhibition and Neil Arnott Bronze Medal in Experimental Physics, and Honours in Botany.

T. W. Fuller.

T. S. Sheldon.

Second Division.

A. D. Deane.

H. Hine.

G. F. Symons.

University of Edinburgh.

Examination for the degree of Bachelor of Medicine.

A. G. Barrs.

C. J. Davey.

W. C. Morris.

Examination for the degree of Master in Surgery.

A. G. Barrs.

C. J. Davey.

University of Aberdeen.

Final Examination for the degree of Bachelor of Medicine.

J. T. Carey.	|	E. J. W. Hicks.
	J. W. Mason.	

Second Examination for the degree of Bachelor of Medicine.

J. T. Carey.	|	E. J. W. Hicks.
W. C. James.		C. Seymour.

First Examination for the degree of Bachelor of Medicine.

J. T. Carey.	|	J. Mackern.
E. J. W. Hicks.		D. D. Malpas.
W. C. James.		C. Seymour.

Examination for the degree of Master in Surgery.

E. J. W. Hicks.		J. W. Mason.
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Indian Medical Service.

February.

W. Beatson,	2173 marks.
W. A. Simmonds,	2120 „

August.

P. A. Weir, M.A., M.B., C.M., 2378 marks.
Obtained the second place at the Examination.

Army Medical Service.

F. W. Trevor,	3955 marks,	Netley.
W. A. May,	3447 „	„

Royal College of Physicians, London.

Examination for the Membership.

J. F. Goodhart, M.D.	|	D. B. Lees, M.A., M.B.
F. C. Turner, M.A., M.D.		

Examination for the Licence.

J. W. Davies.	|	F. E. C. Hood.	|	L. Rudd.
W. K. Johnston.		J. Rendall.		R. C. Gibb.
H. Evans.		F. W. B. Romano.		A. Rawlings.
W. Brown.		J. M. Hobson.		H. C. Taylor.
G. H. Blackmore.		H. F. Lancaster.		H. Bartlett.

Royal College of Surgeons of England.

Final Examination for the Fellowship.

R. C. Chicken.	T. Eastes, M.D.
R. J. Pye-Smith.	W. H. A. Jacobson, B.A., M.B.
T. Jones, M.B.	W. T. Law, M.D.

First Examination for the Fellowship.

L. H. Stevenson.	W. M. Evans.
C. F. Pickering.	

Final Examination for the Membership.

January.

W. M. Jones.	W. C. Morris, M.B.	H. A. Lovett.
E. M. Boddy.	L. Rudd.	O. L. Webb.
H. Duke.	T. Pink.	E. J. Adkins.
J. A. Lewis.	E. S. Newton.	

April.

J. W. Davies.	J. B. Waterhouse.	A. Rawlings.
F. W. R. Romano.	J. M. Hobson.	J. P. Lockwood.
J. Rees.	G. W. Bond.	

May.

C. E. Bell.	T. Brown.	A. Bevan.
J. B. Booth.	W. C. Theed.	E. H. Williams.
R. C. Richards.	A. Piggot.	G. E. Miles.
G. B. Mallam.	W. H. Hall.	H. Cotton.
	D. T. Evans.	

July.

A. G. Lacy.	H. C. Burton.	L. J. Wilding.
St. O. B. Shadwell.	H. C. Taylor.	F. E. C. Hood.
H. F. Lancaster.	O. J. Symonds.	W. Cock.
A. Sangster, M.B.	H. Bartlett.	W. A. E. Hay.
B. Jumeaux.	C. Rees.	A. C. Routh.
O. M. Johnson.	A. D. Brenchley.	R. Coom.
A. L. Bowen.	H. J. Hind.	L. Jones.
A. de W. Baker.		

November.

A. Carey.	E. Amphlett, M.A.	J. J. Lewis.
R. M. Simon, B.A.	J. T. Knight.	J. W. Mason, M.B.
P. J. Jackson.	R. H. Leigh.	W. A. Kidd.
A. Dennis.	R. E. Carrington.	

First Examination for the Membership.

January.

J. Todd.	J. S. Clowes.
E. J. Donbavand.	J. C. Wilkinson.

April.

F. H. Berry.	J. Reader.	A. Pain.
J. C. Uthoff.	J. H. Barnard.	A. St. C. Buxton.
W. Lane.	R. A. Birdwood, B.A.	H. L. Manby.
J. Poland.	W. F. Hearnden.	J. W. Meek.
R. S. Wainewright.	A. Burt.	J. Hammersley.
A. C. Morton.	J. F. McCrea.	T. C. Nugent.
H. Dismorr.	P. Horrocks.	O. Bowen.
W. D. Stamp.	E. C. Greene.	E. B. Granger.
J. W. Collington.	G. Mackern.	O. T. K. Shaw.
H. Davy.	G. A. Wright, B.A.	W. L. Chubb.
W. Dunstan.	A. J. J. Johnston.	W. Strover.
J. Morgan.	A. G. Collington.	C. St. John Wright.
J. T. Hinton.	E. Lynn.	H. J. S. Liddell.
R. Lee.		

May.

G. W. Butler.	A. Smart.	C. H. Keep.
C. J. Plummer.	V. A. Jaynes.	H. Peckett.
T. Hammond.	P. O. Haynes.	J. O. Keer.
B. F. Giles.	F. Waddington.	

July.

H. C. Jee.		H. J. Liebstien.
J. A. Masters.		J. T. Dell.
L. M. B. Jones.		F. I. Blaker.
A. F. Stevens.		

November.

E. C. Beale, B.A.		C. G. W. Lowdell.
T. Jones.		J. H. Poland.

Apothecaries' Society.

Final Examination for the Licence.

January.

A. G. Lacy.

February.

H. Cotton.		H. C. Taylor.
	T. W. Evans.	

March.

H. J. Hind.		T. Evans.
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April.

J. F. J. Sykes.		R. Bevan.
T. B. Donahoo.		W. Phelps.
	G. B. Chadwick.	

May.

P. J. Jackson.		A. D. Brenchley.
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458 *Gentlemen admitted to Practice, &c., in the year 1875.*

	June.	
	W. P. Turner.	
	July.	
J. B. Richardson.		T. K. Fell.
	September.	
	J. T. W. S. Kellard.	
	October.	
	A. C. Parker.	
	November.	
B. W. Gathergood.	|	G. M. Roberts.
	December.	
D. Eloum.	|	J. T. Carey, M.B.

First Examination for the Licence.

	January.	
P. J. Jackson.	|	W. Mount.
	W. P. Turner.	
	February.	
	T. Richards.	
	March.	
	A. C. Parker.	
	April.	
	J. J. W. Grimwood.	
	July.	
	E. J. Pritchard.	
	August.	
	Owen Bowen.	
	September.	
J. T. Dell.	|	J. Todd.
	October.	
	H. W. Roberts.	
	November.	
G. M. Roberts.	|	W. Strover.
	F. A. Hyne.	
	December.	
W. H. L. Welchman.	|	J. Morgan.

GUY'S HOSPITAL MEDALLISTS AND PRIZEMEN, 1874-75.

**EXAMINATION OF STUDENTS IN MEDICINE AND ITS
ALLIED SCIENCES, JULY, 1875.**

The Treasurer's Gold Medal for Medicine.

Alfred Finch, Blackheath.

The Treasurer's Gold Medal for Surgery.

Charters James Symonds, St. John, New Brunswick, Canada.

Third Year's Students.

W. Percy Reynolds, Berkely Lodge, Norwood, First Prize, £40.

Richard Bevan, Redruth, Cornwall, Second Prize, £35.

Justin McCallum McCarthy, Ryde, Isle of Wight, Certificate.

John Brett, North Kensington, Certificate.

Second Year's Students.

John Caldwell Uhthoff, South Penge, Surrey, First Prize, £35.

John Poland, Blackheath, Second Prize, £30.

F. Isaacson Blaker, Brighton, Certificate.

Charles Gross, Erith, Kent, Certificate.

First Year's Students.

Robert Parry, Festiniog, Carnarvon, First Prize, £30.

Edward John Morley, Blackburn, Lancashire, Second Prize, £25.

Henry Ogilvy Stuart, Mulgrave House, Woolwich, Third Prize,
£10 10s. (*Presented by one of the Governors.*)

Gordon B. W. Messum, Grassendale, Dulwich, Certificate.

Morris Fisher Cock, Woodville, South Moulton, Devon, Certificate.

**ENTRANCE EXAMINATION IN CLASSICS, MATHEMATICS, AND
NATURAL SCIENCE, OCTOBER, 1875.**

Leonard Charles Wooldridge, Angell Park, Brixton, First Prize, £60.

William Hale White, Carshalton, Second Prize, £30.

James Thomas Jackman Morrison, Plumstead, Certificate.

Pupils' Physical Society.*Session 1875-76.***Honorary President.—Mr. COCK.****Presidents.**

Messrs. R. E. Carrington, H. Clarke, F. C. Coley, H. Davy, E. Duke, D. Elcum, W. H. Harsant, J. M. Hobson, A. H. Jones, W. A. Kidd, H. F. Lancaster, J. M. McCarthy, J. Morgan, St. C. B. Shadwell, C. J. Symonds, and J. B. Waterhouse.

Honorary Secretaries.—F. TAYLOR, M.D.; R. CLEMENT LUCAS, B.S.

PRIZEMEN FOR THE SESSION 1874-75.

Mr. C. J. Symonds, £10, for his Paper, "Notes on some Symptoms of Rheumatic Fever," read before the Society.

Mr. J. M. Hobson, £5, for his Paper on "The Morbid Sounds of the Heart," read before the Society.

Mr. R. E. Carrington, £5, for his Essay on "Alcohol, as Food, Drug, and Poison."

Mr. F. C. Coley, £5, as the Member who had distinguished himself most in the Debates of the Session.

CLINICAL APPOINTMENTS HELD IN THE YEAR 1875.**RESIDENT HOUSE PHYSICIANS.**

H. Hetley, M.B.	H. Clarke.
F. T. Paul.	A. H. Jones.
J. F. Fry.	D. H. Forty.

RESIDENT HOUSE SURGEONS.

H. S. Branfoot, M.B.	H. Harsant.
H. Williams.	J. C. Ferrier.
D. H. Forty.	J. F. Fry.

RESIDENT OBSTETRIC ASSISTANTS.

W. H. Harsant.	H. N. Smith.	L. Rudd.
R. C. Gibb.	J. C. Ferrier.	H. Clarke.
T. S. Morley, M.B.	H. Evans.	H. Duke.
D. B. Lees, M.A., M.B.	J. M. Hobson.	A. H. Jones.

SURGEON'S DRESSERS.

A. De W. Baker.	F. O. Coley.	A. G. Lacy.
W. Cock.	R. E. Carrington.	E. Duke.
J. J. Newman.	St. C. B. Shadwell.	J. W. Bull.
H. F. Lancaster.	D. C. Morgan.	A. Finch.
E. Amphlett, M.A.	H. L. Champneys.	F. W. R. Romano.
H. C. Burton.	W. A. Kidd.	A. W. Green.
H. Bartlett.	A. L. Bowen.	A. D. Brenchley.
C. J. Symonds,	T. L. Porter, B.A.	G. Davis.

CLINICAL ASSISTANTS.

A. H. Jones.	J. B. Richardson.	R. E. Carrington.
H. Duke.	W. Brown.	H. F. Lancaster.
L. Rudd.	A. Finch.	F. C. Coley.
H. Evans.	W. H. L. Welchman.	C. J. Symonds.
D. C. Morgan.	J. W. Bull.	A. de W. Baker.
G. Davis.	D. T. Evans.	St. C. B. Shadwell.

DRESSERS IN THE EYE WARDS.

J. C. Ferrier.	H. Duke.	W. Cock.
W. J. Tyson.	F. W. R. Romano.	D. T. Evans.
A. L. Bowen.	E. Amphlett, M.A.	D. C. Morgan.
R. C. Gibb.		

MEDICAL CLINICAL CLERKS.

T. R. Judson.	O. W. Lacey.	H. W. Ewen.
G. Davis.	H. L. Champneys.	C. F. Pickering.
A. G. Lacy.	G. B. Mallam.	P. Wallis.
R. E. Carrington.	T. L. Porter, B.A.	J. M. McCarthy.
A. W. Green.	W. Tarrant.	R. O. Cusack.
H. W. Roberts.	F. E. O. Hood.	E. F. Ingram.
H. C. Taylor.	W. Phelps.	G. W. Butler.
W. Mount.	F. G. Stewart.	A. W. Green.
R. W. Oram.	R. Bevan.	B. W. Gathergood.
E. Duke.	G. R. Chadwick.	S. V. Instone.
J. W. Bull.	J. B. Waterhouse.	J. S. Clowes.
A. Finch.	W. M. Evans.	H. J. S. Liddell.
W. H. L. Welchman.	J. Todd.	J. C. Wilkinson.
A. F. Wilson.	W. P. Turner.	J. Mackern.
A. D. Brenchley.	E. J. Donbavand.	T. Duke, M.A.
D. Elcum.	C. P. Creed.	W. Stover.
J. F. Breach.	J. T. W. S. Kellard.	J. F. Dell.
A. Piggot.	J. Brett.	A. G. Barrs, M.B.
A. Dennis.	W. P. Reynolds.	A. Pain.
T. K. Fell.	E. G. Dutton.	
W. A. Kidd.	T. A. Richardson.	

ASSISTANT-SURGEON'S DRESSERS.

H. L. Champneys.	T. F. Pedley.	A. C. Brock.
P. J. Jackson.	R. M. Simon, B.A.	W. D. Stamp.
C. J. Symonds.	P. E. Wallis.	A. C. Parker.
R. Bevan.	H. W. Roberts.	F. Waddington.
J. Brett.	T. W. Richards.	J. T. Gardner.
W. P. Reynolds.	S. V. Instone.	H. L. Stevenson.
G. B. Mallam.	A. M. Turner.	P. F. Gilbert.
J. M. McCarthy.	H. J. Hind.	W. P. Turner.
W. A. Kidd.	H. H. Williams.	J. Todd.
T. K. Fell.	J. T. Knight.	C. T. K. Shaw.
A. C. Routh.	E. G. Dutton.	C. E. Perry.
A. Rawlings.	O. G. Lee.	G. Mackern.
B. W. Gathergood.	A. F. Wilson.	J. W. Collington.
T. Duke, M.A.	C. W. Lacey.	T. A. Richardson.
J. Mackern.	W. Tarrant.	H. W. Ewen.
G. R. Chadwick.	J. C. Wilkinson.	T. Y. Jones.
A. W. Green.	A. Smart.	C. St. J. Wright.
R. O. Cusack.	H. J. S. Liddell.	C. F. Pickering.
E. J. Donbavand.	O. T. Slatter.	W. Lane.
C. P. Creed.	J. J. W. Grimwood.	J. Reader.
E. T. Ingram.	E. C. Greene.	

DRESSERS IN THE SURGERY.

J. S. Clowes.	W. W. Leigh.	R. Lee.
T. A. Richardson.	R. A. H. Hart.	G. H. Parry.
A. M. Turner.	J. G. Harries.	J. K. Womersley.
J. T. Gardner.	A. Pain.	E. Roper.
J. J. W. Grimwood.	H. W. Ewen.	W. L. Chubb.
F. G. Stewart.	A. St. C. Buxton.	W. H. Puddicombe.
H. L. Stevenson.	J. W. Collington.	J. A. Masters.
A. C. Brock.	W. Lane.	C. G. W. Lowdell.
G. A. Hunt.	A. Smart.	L. M. B. Jones.
S. V. Instone.	A. C. Morton.	G. F. Crooke.
W. Gibson.	R. S. Wainwright.	J. F. M'Crea.
T. Richards.	J. Hammersley.	J. T. Hinton.
O. T. Slatter.	T. C. Nugent.	H. J. S. Liddell.
H. Stevens.	R. A. Birdwood, B.A.	G. Slack.
P. F. Gilbert.	P. Haynes.	H. L. Manby.
W. P. Turner.	A. G. Collington.	A. G. Wells.
A. C. Parker.	J. Reader.	P. Horrocks.
C. E. Perry.	W. D. Stamp.	H. W. G. Phillips.
E. C. Greene.	C. St. J. Wright.	F. W. Apthorp.
T. Y. Jones.	Owen Bowen.	A. T. Nunn.
E. R. Mansell.	J. C. Keer.	

DENTAL SURGEON'S DRESSERS.

T. F. Pedley.	S. V. Instone.
T. Jones.	W. P. Turner.
E. H. Williams.	T. A. Roberts.
J. Todd.	W. Tarrant.

AURAL SURGEON'S DRESSERS.

W. Gibson.	S. Smith.
T. F. Pedley.	L. M. B. Jones.
T. A. Richardson.	S. V. Instone.
G. Davis.	

OBSTETRIC OUT-PATIENT CLERKS.

W. C. Theed.	B. Jones.	E. F. Ingram.
T. A. Bell.	J. Davies.	T. Brown.
E. Whitworth.	J. Mackern.	J. J. Newman.
T. L. Porter, B.A.	A. G. Lacy.	E. Amphlett, M.A.
F. C. Coley.	A. W. Green.	J. Brett.
W. A. Hay.	T. F. Pedley.	R. O. Cusack.
E. Duke.	P. F. Gilbert.	H. C. Burton.
T. R. Judson.	J. B. Waterhouse.	R. M. Simon, B.A.

ASSISTANT-PHYSICIANS' CLERKS.

J. J. Lewis.	W. P. Reynolds.	E. R. Kavanaugh.
H. Wright.	J. Brett.	J. A. Masters.
C. P. Creed.	J. Todd.	S. V. Instone.
C. E. Bell.	W. M. Evans.	T. A. Richardson.
C. W. Lacey.	W. P. Turner.	T. F. Pedley.
B. F. Giles.	J. J. W. Grimwood.	J. S. Clowes.
J. B. Waterhouse.	E. G. Dutton.	C. F. Pickering.
E. F. Ingram.	E. C. Beale, B.A.	W. D. Stamp.
R. R. W. Oram.	C. T. K. Shaw.	C. G. Lee.
J. M. McCarthy.	H. H. Williams.	

POST-MORTEM CLERKS.

S. Smith.	J. C. Wilkinson.	W. J. Coles.
H. H. Williams.	H. W. Ewen.	C. J. C. Otway.
A. L. Owen.	S. V. Instone.	W. P. Reynolds.
A. C. Brock.	J. S. Clowes.	J. Brett.
W. M. Evans.	R. A. Birdwood, B.A.	E. Amphlett, M.A.
B. Jones.	J. W. Collington.	E. G. Dutton.
T. A. Richardson.	E. Roper.	

EXTERNS.

W. Tarrant.	C. E. Perry.	R. R. W. Oram.
T. Y. Jones.	H. B. Collins.	L. M. B. Jones.
H. L. Champneys.	A. E. Webb.	C. H. Keep.
J. H. Dunlop.	H. Stevens.	A. Burt.
H. W. Ewen.	T. Duke, M.A.	J. T. Gardner.
E. J. Donbavand.	A. L. Reynolds.	O. Cusack.
J. W. Collington.	E. Roper.	J. C. Keer.
J. C. Wilkinson.	T. E. Abbott.	W. Peyton.
F. W. Apthorp.	G. R. Green.	E. G. Dutton.
E. C. Greene.	B. F. Giles.	P. O. Haynes.
J. W. Bull.	G. F. Crooke.	H. J. Liebsstein.
H. A. Collins.	R. T. Kent.	R. Thomas.
A. Finch.	F. Gillingham.	W. M. Evans.
R. E. Carrington.	W. D. Hartley.	A. Smart.
R. A. Ross.	T. Dutton.	P. Horrocks.
F. A. Hyne.	J. A. Masters.	J. W. Meek.
D. Elcum.	O. Seth.	G. Mackern.
W. P. Reynolds.	J. T. Hinton.	C. F. Pickering.
L. H. Stevenson.	W. Dunstan.	A. Pain.
A. C. Kendall.	J. J. Newman.	S. S. Bowles.
W. A. Kidd.	A. G. Wells.	
C. G. Lee.	H. W. G. Phillips.	

SURGICAL CLINICAL CLERKS.

L. H. Stevenson.	H. O. Stuart.	J. F. M'Crea.
T. Richards.	C. E. Stanger.	J. H. Barnard.
P. F. Gilbert.	C. Wood.	J. F. Briscoe.
C. E. Perry.	E. R. Morse.	E. Granger.
J. H. Harris.	C. W. S. Magrath.	W. F. Hearnden.
D. D. Roberts.	G. H. W. Jones.	V. A. Jaynes.
E. C. Beale, B.A.	R. Settle.	G. F. Crooke.
R. A. Ross.	A. C. Otway.	C. J. O. Otway.
W. P. Turner.	E. Lynn.	W. L. Chubb.
A. C. Parker.	W. Dunstan.	R. A. H. Hart.
W. Peyton.	J. T. Hinton.	J. C. Uthoff.
A. Pain.	A. J. J. Johnston.	J. K. Womersley.
H. Wright.	C. T. K. Shaw.	H. Peskett.
A. Bain.	H. L. Manby.	P. Horrocks.
E. W. Deare.	T. Hammond.	J. W. Meek.
J. Osborne.	J. Morgan.	J. Poland.
C. J. Parke.	G. H. Kinch.	S. S. Bowles.
L. W. Reynolds.	W. A. Phillipps.	F. H. Berry.
A. G. Wells.	R. W. White.	T. B. Cross.
T. Dutton.	H. W. Whyte.	H. Davy.
E. Roper.		

ASSISTANT-SURGEON'S CLERKS.

A. Burt.	G. Pilkington.	J. Harrison.
C. Wood.	T. E. Abbott.	J. R. Harris.
J. F. Briscoe.	F. T. Wilkinson.	R. A. H. Hart.
C. H. Keep.	E. J. Morley.	S. V. Theed.
G. B. W. Messum.	A. C. Otway.	C. G. W. Lowdell.

GUY'S HOSPITAL.

THE SESSION OF 1875-76 COMMENCED ON THE
1st OCTOBER, 1875.

THE INTRODUCTORY ADDRESS was given by
THOMAS STEVENSON, Esq., M.D.,

On Friday, the 1st of October, 1875, at Two o'clock, after which the Medals and
Prizes for the past Session were distributed by the President, LORD LAWRENCE.

MEDICAL AND SURGICAL STAFF.

Consulting Physicians.

SIR W. GULL, Bart., M.D., D.C.L., F.R.S.; G. OWEN REES, M.D., F.R.S.

Physicians.

S. O. HABESHON, M.D.; S. WILKS, M.D., F.R.S.; F. W. PAVY, M.D., F.R.S.;
W. MOXON, M.D.

Assistant Physicians.

C. HILTON FAGGE, M.D.; P. H. PYE-SMITH, M.D.; FREDERICK TAYLOR, M.D.

Consulting Surgeons.

J. HILTON, Esq., F.R.S.; E. COCK, Esq.

Surgeons.

J. COOPER FORSTER, Esq.; THOMAS BRYANT, Esq.; ARTHUR E. DURHAM, Esq.;
H. G. HOWSE, M.S.

Assistant Surgeons.

N. DAVIES-COLLEY, M.C.; R. CLEMENT LUCAS, B.S.; C. H. GOLDING-BIRD, M.B.

Consulting Obstetric Physician.—HENRY OLDHAM, M.D.

Obstetric Physician.—J. BRAXTON HICKS, M.D., F.R.S.

Assistant Obstetric Physician.—A. L. GALABIN, M.D.

Ophthalmic Surgeon.—C. BADER, Esq.

Assistant Ophthalmic Surgeon.—C. HIGGINS, Esq.

Dental Surgeon.—S. J. A. SALTER, M.B., F.R.S.

Assistant Dental Surgeon.—H. MOON, Esq.

Aural Surgeon.—W. LAIDLAW PURVES, Esq.

Medical Registrars.—FREDERICK TAYLOR, M.D.; J. F. GOODHART, M.D.

Surgical Registrar.—FREDERIC DURHAM, M.B.

Curator of the Museum.—C. HILTON FAGGE, M.D.

Apothecary and Secretary to the School.—JAMES STOCKER, Esq.

Dean.—F. TAYLOR, M.D.

WINTER COURSES.

LECTURES.

Medicine.—Dr. HABERSHON and Dr. WILKS.

Mondays, Wednesdays, and Fridays, at Three.

Clinical Medicine.—Dr. HABERSHON, Dr. WILKS, Dr. PAVY, and Dr. MOXON.

Saturdays, at Half-past One.

Surgery.—Mr. BRYANT and Mr. DURHAM.

Tuesdays and Thursdays, at Half-past Three, and Saturdays.

Clinical Surgery.—Mr. FORSTER, Mr. BRYANT, Mr. DURHAM, and Mr. HOWSE.

Wednesdays, at Half-past One.

Anatomy, Descriptive and Surgical.—Mr. HOWSE and Mr. DAVIES-COLLEY.

Tuesdays, Wednesdays, Thursdays, and Fridays, at Nine.

Physiology and General Anatomy.—Dr. PAVY and Dr. PYE-SMITH.

Mondays, Wednesdays, and Fridays, at a Quarter-past Four.

Clinical Lectures on Midwifery and Diseases of Women.—Dr. BRAXTON HICKS.

Wednesdays, at Half-past One.

Chemistry.—Dr. DEBUS and Dr. STEVENSON.

Tuesdays, Thursdays, and Saturdays, at Eleven.

Experimental Philosophy.—Prof. A. W. REINOLD.

Mondays, at Eleven.

DEMONSTRATIONS.

Practical Surgery.—Mr. DAVIES-COLLEY.

Practical Anatomy.—Mr. R. CLEMENT LUCAS, *Demonstrator.*

Mr. GOLDING-BIRD and Mr. JACOBSON, *Assistant Demonstrators, Daily.*

Morbid Anatomy.—Dr. FAGGE and Dr. GOODHART.

Daily, at Half-past Two, throughout the year.

Cutaneous Diseases.—Dr. F. TAYLOR.

Tuesdays, at One, throughout the year.

Practical Physiology.—Dr. PYE-SMITH.

Mondays, Thursdays, and Fridays, at Half-past One.

SUMMER COURSES.

LECTURES.

Materia Medica and Therapeutics.—Dr. MOXON.

Tuesdays, Thursdays, and Fridays, at Three.

Midwifery and Diseases of Women.—Dr. BRAXTON HICKS.

Tuesdays, Wednesdays, Thursdays, and Fridays, at Nine.

Medical Jurisprudence.—Dr. ALFRED S. TAYLOR.

Tuesdays, Thursdays, and Saturdays, at Ten.

Clinical Medicine.—Dr. FAGGE, Dr. PYE-SMITH, and Dr. F. TAYLOR.

Wednesdays, at Half-past One.

Clinical Surgery.—Mr. DAVIES-COLLEY, Mr. CLEMENT LUCAS, and Mr. GOLDING-BIRD.

Fridays, at Half-past One.

Ophthalmic Surgery.—Mr. BADER.

Thursdays, at Two.

Clinical Lectures on Diseases of Women.—Dr. A. L. GALABIN.

Tuesdays, at Three.

Pathology.—Dr. FAGGE, *Saturdays, at Nine.*

Hygiene.—Dr. F. TAYLOR.

Wednesdays, at a Quarter past Twelve.

Comparative Anatomy and Zoology.—Mr. JACOBSON.

Mondays and Wednesdays, at Half-past One.

Mental Diseases.—Dr. SAVAGE.

Tuesdays and Fridays, at Half-past Eleven.

Botany.—Dr. STOKES.

Tuesdays, Thursdays, and Saturdays, at Half-past Eleven.

Dental Surgery.—Mr. MOON.

DEMONSTRATIONS.

Practical Chemistry.—Dr. DEBUS, F.R.S.

Mondays, Wednesdays, and Fridays, Ten to One.

Morbid Histology.—Mr. HOWSE.

Wednesdays and Saturdays, at One.

Operative Surgery.—Mr. DAVIES-COLLEY.

Practical Courses and University Classes in Anatomy, Physiology, Botany, Comparative Anatomy, and Natural Philosophy.

The Registrars and the Demonstrators of Practical Surgery, Anatomy and Chemistry, assist Pupils in their Studies, and prepare them for their several Examinations by Special Class Instruction, during both Winter and Summer Sessions.

The Hospital now contains 695 beds. Of these, 220 are for Medical Cases; 266 for Surgical Cases; 26 for Diseases of Women; 85 for Syphilitic, and 50 for Ophthalmic Cases. There are also 30 Children's cots, and 60 reserve beds, with 8 in private rooms.

In connection with the Lying-in Charity, about 2500 cases are annually attended by the Students.

Number of patients relieved during the year, about 91,000.

Clinical Lectures in Medicine, Surgery, and Midwifery, weekly.

The Museums of Anatomy, Pathology, and Comparative Anatomy, contain 11,000 Specimens, 4500 Drawings and Diagrams, an unique collection of Anatomical Models, and a series of 600 Models of Skin Diseases.

Appointments.—The House Surgeons and House Physicians, the Obstetric Residents, Clinical Assistants, Dressers, Clinical Clerks, and Dressers in the Eye Wards, are selected from the Students according to merit, and appointed without extra fee. There are also a large number of Junior Appointments, every part of the Hospital practice being systematically employed for instruction.

Prizes.—Two Scholarships of the value of £60 and £30 are awarded in October to first year's Students for proficiency in Classics and Mathematics, Modern Languages, Botany, Physics, and Chemistry.

Six Scholarships, varying in value from £10 to £50 each, are awarded at the close of each Summer Session for general proficiency.

Two Gold Medals are annually given by the Treasurer—one in Medicine and one in Surgery.

Two additional Scholarships will be awarded for the first time in the year 1876-77, of the value of £10 and £15 respectively.

Fees.—The payment of 100 Guineas in one sum on entrance, or in two moieties, at the commencement of the first Winter and of the following Summer Session, entitles a Student to a Perpetual Ticket.

Payment may be made by instalments at the commencement of each sessional year, as follows:—First year, £40; second year, £40; third year, £30; on payment of this instalment the Student is entitled to a Perpetual Ticket.

Gentlemen desirous of becoming students must give satisfactory testimony as to their education and conduct.

Several of the Lecturers have vacancies for Resident Private Pupils.

For further information apply to the Dean, Dr. F. Taylor, or the Medical Secretary, Mr. J. Stocker.

